3.2 perfect competition and monopolies
Rank the competitiveness of the following markets. First rank each market according to the each of the four assumptions of a competitive market, and then rank the overall competitiveness. The first one is done for you.

<table>
<thead>
<tr>
<th>Market</th>
<th>no. of buyers &amp; sellers</th>
<th>barriers to entry</th>
<th>identical product?</th>
<th>perfect knowledge?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Stalls in a Farmers’ Market</td>
<td>few</td>
<td>none</td>
<td>unique</td>
<td>imperfect</td>
</tr>
<tr>
<td>Domestic Air Travel in New Zealand</td>
<td>few</td>
<td>none</td>
<td>unique</td>
<td>imperfect</td>
</tr>
<tr>
<td>New Zealand Market for Mobile Phones</td>
<td>few</td>
<td>none</td>
<td>unique</td>
<td>imperfect</td>
</tr>
<tr>
<td>Food Hall in a Shopping Mall</td>
<td>few</td>
<td>none</td>
<td>unique</td>
<td>imperfect</td>
</tr>
<tr>
<td>New Zealand Market for Petrol</td>
<td>few</td>
<td>none</td>
<td>unique</td>
<td>imperfect</td>
</tr>
</tbody>
</table>

2. Some people would argue that a market on Trademe (e.g. for LEGO blocks) is perfectly competitive. Use your understanding of the competitive assumptions (of a competitive market) to support or refute this statement.

The product is almost identical. There are lots of buyers and sellers. It’s very easy for anyone to access an auction (as a buyer) or set up a new auction (as a seller). Customers can surf the site to compare prices, i.e. perfect knowledge. Therefore it is very close to perfect.

4. Define the following terms. Check that you can define each term and use it in an appropriate context.

- barriers to entry
- identical product
- imperfect competition
- perfect competition
- perfect knowledge

Exercise 1.1 the economic problem
Noah’s Ark Boating Ltd. builds luxury yachts for the world’s elite.

1. Classify each of the following expenses as to whether they are fixed, variable or semi-variable.

- **Variable** The cost of timber and marine varnish.
- **Variable** Staff wages.
- **Variable** Depreciation on tools, when the number of boats produced is considered to be the factor responsible for the amount of this cost.
- **Fixed** Rent paid on the building yard. This is negotiated bi-annually.
- **Fixed** The annual fire insurance premium on plant and buildings.
- **Variable** PAYE paid to government.
- **Fixed** Annual marketing bill paid to ‘Worldwide Promotions Ltd.’ (semi-variable)
- **Semi-variable** PAYE paid for workers who are employed on month-long contracts depending on demand.
- **Variable** The electricity bill (or semi-variable)
- **Variable** Overtime wages paid to staff when jobs fall behind schedule.

2. Rank the following factors of production (costs) in terms of their being fixed, semi-variable or variable:

- Management (on monthly salary)
- Factory Buildings
- Casual Staff
- Leased Vehicles
- Land on a farm
- Electricity
- Marketing expenses

**Fixed Costs**
- Factory buildings
- Land on a farm
- Leased vehicles

**Semi-variable Costs**
- Marketing expenses
- Management
- Electricity
- Casual staff

**Variable Costs**
- Overtime wages paid to staff when jobs fall behind schedule.
On Trade Me, there are now hundreds of sellers of second-hand console games, making the market nearly perfectly competitive. The graph below shows cost curves facing a typical seller of console games.

1. Label the axis and curves on the graph below.

2. Complete the following graph:

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Marginal Cost</th>
<th>Avg. Variable Cost</th>
<th>Average Cost</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15</td>
<td>30</td>
<td>62</td>
<td>Q x AC</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>18</td>
<td>47</td>
<td>62</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>12</td>
<td>35</td>
<td>94</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
<td>16</td>
<td>28</td>
<td>105</td>
</tr>
<tr>
<td>5</td>
<td>25</td>
<td>12</td>
<td>25</td>
<td>112</td>
</tr>
<tr>
<td>6</td>
<td>52</td>
<td>17</td>
<td>28</td>
<td>125</td>
</tr>
<tr>
<td>7</td>
<td>100</td>
<td>19</td>
<td>39</td>
<td>168</td>
</tr>
</tbody>
</table>

3. At what price and quantity would the firm ...

   ... earn a normal profit?  
   P: $25  Q: 5

   ... break even?  
   P: $25  Q: 5

   ... shut down (below this price)?  
   P: $10  Q: 4
Identify AC, MC, AR and MR on the graph below.

2. Use the graph above to complete the table below:

<table>
<thead>
<tr>
<th>Output</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC</td>
<td>13</td>
<td>14</td>
<td>19</td>
<td>29</td>
<td>41</td>
<td>69</td>
</tr>
<tr>
<td>AC</td>
<td>41</td>
<td>34</td>
<td>30</td>
<td>29</td>
<td>30</td>
<td>34</td>
</tr>
<tr>
<td>TC</td>
<td>123</td>
<td>136</td>
<td>150</td>
<td>174</td>
<td>210</td>
<td>272</td>
</tr>
<tr>
<td>MR</td>
<td>41</td>
<td>41</td>
<td>41</td>
<td>41</td>
<td>41</td>
<td>41</td>
</tr>
<tr>
<td>AR</td>
<td>41</td>
<td>41</td>
<td>41</td>
<td>41</td>
<td>41</td>
<td>41</td>
</tr>
<tr>
<td>TR</td>
<td>123</td>
<td>164</td>
<td>205</td>
<td>246</td>
<td>287</td>
<td>328</td>
</tr>
<tr>
<td>Economic Profit</td>
<td>0</td>
<td>28</td>
<td>55</td>
<td>72</td>
<td>77</td>
<td>56</td>
</tr>
</tbody>
</table>

3. What is the firm’s profit-maximising level of output? How would you describe this type of profit?

Output: 7  Type of profit: supernormal

4. Shade in the area on the graph that represents the firm’s economic profit at the profit-maximising output.

5. Why does the firm not maximise its profits if it produces 8 units of output?

The extra/marginal cost of producing the 8th unit of output is greater than the extra/marginal revenue that the firm earns. So producing and selling this unit will reduce the firm’s profit.

6. Why does the firm not maximise its profits if it produces 5 units of output?

The firm would miss out on extra profit if it only produced 5 units and so it would not be maximising its profit.
Show the profit-maximising (loss-minimising) output and economic profit for the following markets. Label the price as $P_i$ and output as $Q_i$. Shade in the economic profit as appropriate.

1. Type of Economic Profit: **Super-normal**

2. Type of Economic Profit: **Sub-normal**

3. Type of Economic Profit: **Sub-normal**
Imagine you are a business consultant.

1. The situations below represent different firms in a perfectly competitive market. What advice would you give each firm?

a. You're doing great. Keep your output where it is currently.

b. Increase your output to maximise your profits (minimise your loss).

c. Decrease your output to maximise your profits (minimise your loss).

d. Shutdown your business until market conditions (i.e. price) improves.

e. Go back and re-do your books. Your numbers make no sense.

<table>
<thead>
<tr>
<th>Price (P)</th>
<th>Output</th>
<th>Total Revenue (P \times Q)</th>
<th>Total Cost</th>
<th>Total Fixed Cost</th>
<th>Total Variable Cost (\Delta x \times Q)</th>
<th>Average Cost</th>
<th>Average Variable Cost</th>
<th>Marginal Cost</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.00</td>
<td>2 000</td>
<td>8,000</td>
<td>6,000</td>
<td>2 000</td>
<td>4,000</td>
<td>3.00</td>
<td>4.00</td>
<td></td>
<td>A a</td>
</tr>
<tr>
<td>4.00</td>
<td>4 000</td>
<td>16 000</td>
<td>12,800</td>
<td>4 000</td>
<td>8,800</td>
<td>3.20</td>
<td>2.20</td>
<td>4.40</td>
<td>B C</td>
</tr>
<tr>
<td>15.00</td>
<td>3 000</td>
<td>45 000</td>
<td>12,000</td>
<td>3 000</td>
<td>9 000</td>
<td>at minimum</td>
<td>1.00</td>
<td>4.00</td>
<td>C b</td>
</tr>
<tr>
<td>1.00</td>
<td>1 500</td>
<td>3,000</td>
<td>1,500</td>
<td>2 000</td>
<td>at minimum</td>
<td>1.00</td>
<td>1.00</td>
<td>0.75</td>
<td>D e</td>
</tr>
<tr>
<td>1.50</td>
<td>2 000</td>
<td>3,000</td>
<td>1,800</td>
<td>800</td>
<td>2,200</td>
<td>1.60</td>
<td>1.50</td>
<td></td>
<td>E d</td>
</tr>
<tr>
<td>9.00</td>
<td>2 000</td>
<td>18 000</td>
<td>18,000</td>
<td>6 000</td>
<td>12 000</td>
<td>6.00 at minimum</td>
<td>1.00</td>
<td>6.00</td>
<td>F b</td>
</tr>
<tr>
<td>1.00</td>
<td>4 000</td>
<td>4,000</td>
<td>6,000</td>
<td>1 000</td>
<td>5,000</td>
<td>1.50</td>
<td>1.20</td>
<td>1.00</td>
<td>G d</td>
</tr>
<tr>
<td>1.50</td>
<td>1 000</td>
<td>1 500</td>
<td>3,000</td>
<td>1 000</td>
<td>2 000</td>
<td>1.50</td>
<td>1.50</td>
<td></td>
<td>H d</td>
</tr>
</tbody>
</table>

2. Three of your clients prefer pictures to help them understand. Draw the situation facing clients A, F and H on the axis below. Be sure to fully label all the cost curves and add the MR/AR curve. Show the profit maximising price \(P\) and output \(Q\), and show any economic profit.
The following graph shows a perfectly competitive firm.

1. Fully label the curves on the graph.

2. Why are marginal revenue and average revenue the same in a perfectly competitive market?
   - Because firms are price takers. This is because of
   - the four assumptions of a P.C. market. Because there are
   - lots of sellers, the firm is too small to influence the price.
   - Because the product is identical, consumers will buy elsewhere
   - if the firm raises the price. Therefore it sells all goods at the

3. Why are the marginal and average revenue curves horizontal for a firm in a perfectly competitive market.
   - See answer above.

4. Identify the profit maximising (loss-minimising) level of output \(Q_{PM}\) and price \(P_{PM}\).

5. Identify the firm’s economic profit by shading it in on the graph and giving it an appropriate label.

6. Explain why this firm will not raise its price.
   - If the firm raised its price, all of its customers
   - would buy elsewhere, i.e. it would lose all of
   - its sales.

7. Show a new MR/AR curve that would result in the firm earning normal economic profits. Identify the new
   - profit-maximising output \(Q_2\) and price \(P_2\).
Imagine the market for apricots is perfectly competitive.

1. Show the market equilibrium price and quantity in the market for apricots.
2. Show the short-run profit-maximising (loss-minimising) output for the individual orchard.
3. Identify and label the economic profit (if any) experienced by the individual orchard.

4. Why will the situation shown above not change in the short-run?
   
   **Because at least one factor of production (resource) is fixed and so firms can't enter or leave the market in the short-run.**

5. Show how the individual orchardist will respond to the current market situation in the long-run. Clearly show (and label) the impact of this on both graphs above.

The graphs below show the market for apples. Assume that this market is perfectly competitive.

6. Show the short-run situation in the market and for the single orchard.
7. Show the long-run situation in the market and for the single orchard.
The Pakuranga Night Market operates in the Pakuranga Mall every Saturday from 6.00pm until 12.00pm. There are many stall-holders selling fast food to the thousands of customers who come each week. It is a good example of a (nearly) perfectly competitive market.

1. In the graphs below, show:
   - the market equilibrium price ($P_e$) and quantity ($Q_e$)
   - the average revenue (AR) and marginal revenue (MR) curves for the individual stall-holder
   - the profit-maximising level of output ($Q_{PM}$) for the individual stall-holder

2. The market has grown more popular as word of it spreads through Auckland, i.e. demand has grown. Show the short-run impact of this on the market for meals.

3. Compare the short-run and long-run response of individual stall-holders and the market as a whole to the increase in demand. Your answer should explain the difference between short-run and long-run, and how prices / economic profits affect producers' decisions.

The short-run is any period of time in which at least one resource or cost is fixed. In the case of the night market this would be as long as it takes to rent (or close) a stall or purchase the cooking equipment needed. In the short-run an firms can enter or leave the market. So the stall-holders only have 2 choices - how much to produce and whether to stay open or shut down. In the long-run, stall-holders can enter or leave the night market. All these decisions are based on the price. In the short-run if the price is above the shut-down point (the lowest point on the AVC curve), the firm will stay open and produce the profit-maximising output, i.e. where $MC = MR$.

In the long-run the firm will only stay in the industry if it is breaking even (earning a normal profit), i.e. $AC = AR$. 

---

Exercise 2.8 Perfect Competition
The following graphs show perfectly competitive markets.

For each market:
1. describe and show the short-run facing the individual firm
2. show the long-run equilibrium and profit-maximising output level for the individual firm

Exercise 2.9 Change in Perfect Competition

<table>
<thead>
<tr>
<th>INDIVIDUAL FIRM</th>
<th>MARKET</th>
</tr>
</thead>
<tbody>
<tr>
<td>$/unit</td>
<td>$/unit</td>
</tr>
<tr>
<td>MC</td>
<td>S</td>
</tr>
<tr>
<td>AVC</td>
<td>D</td>
</tr>
<tr>
<td>Q</td>
<td>Q'</td>
</tr>
<tr>
<td>Q_m</td>
<td>Q'</td>
</tr>
</tbody>
</table>

**Note:** I have changed S to D to fix this example.

Explain why a firm, faced with the market price being below the shutdown point, might shut down in the short-run, but try to stay open in the long-run in the hope that other firms will leave the industry.

In the short-run, the firm will minimise its loss by shutting down if the price is not covering its avoidable costs, i.e. P is below the lowest point on the AVC curve. In the long-run, firms will leave the industry. This reduces market supply causing a shortage and consumers to bid up the price until firms who stay in the industry earn normal profits. A firm could try to be one of the firms who stay.
PERFECT COMPETITION AND MONOPOLIES (3.2)

1. Explain why the individual vendors (sellers) of printed material are price takers in the Bhenghazi market.

Individual vendors are price takers because they sell an identical product and there are lots of buyers and sellers. No firm can influence the Bhenghazi market because it is too small to do so.

2. On Graph 1 ...
   a) show the average revenue (AR) and marginal revenue (MR) curves for the typical individual vendor of printed material at the market price of US$4.50 per square metre
   b) show the profit-maximising equilibrium price ($P_{pm}$) and quantity ($Q_{pm}$).
   c) identify and label the area that represents the economic profit at $Q_{pm}$.

3. Explain why the price for printed material will not change in the short-run.

In the short-run, at least one factor of production is fixed and so firms can not enter or leave the market for printed material.

---

The Bhenghazi St market is a good example of perfect competition. Each day large number of individual vendors come and set up stalls to sell their various products.

On one day, a researcher counted 40 vendors supplying printed material for sale to the hundreds of customers. The price of this was US$4.50 per square metre.
4. Explain how individual vendors of printed material, and therefore the market, will respond to the situation you showed in question (2) and on Graph 1.

In your answer:

- compare the long-run response of individual vendors will respond to the situation in question (2) to their short-run decisions
- describe how the long-run decisions of individual vendors will affect the market
- make appropriate changes to Graph 1 to show the **long-run changes** to the marginal revenue / average revenue curve faced by the individual vendor
- identify on Graph 1 the new quantity \( Q_{\text{NEW}} \) and price \( P_{\text{NEW}} \) of printed material in the long-run
- use marginal analysis to explain why individual firms change their quantity sold in response to the change in price

---

In the long-run all factors of production are fixed and so firms can enter or leave the industry (unlike in the short-run).

At the market price \( P_{\text{NEW}} \) of $4. So, firms earn subnormal profits.

In the long-run some firms will choose to leave the Shanghai market to avoid earning subnormal profits.

This will reduce market supply and result in a market shortage. Consumers will respond by bidding up the price.

As the price rises, firms will respond by increasing their individual output to maximise their profits. They do this because as the price rises and so too does marginal revenue. At the old level of output, \( MR > MC \) and the firm is missing out on possible profit. So it raises output until \( MR = MC \) again (at \( Q_{\text{NEW}} \)).

This process will continue until firms earn normal profits and no firms are leaving the market.
The graphs below show a perfectly competitive market and the situation facing an individual firm in that market.

1. On Graph 3, identify and label the firm’s:
   - average revenue and marginal revenue
   - profit-maximising price level \( P_{\text{PM}} \) and output level \( Q_{\text{PM}} \)
   - the economic profit experienced by the market

2. Using marginal analysis, explain why the firm will not produce more or less than \( Q_{\text{PM}} \).

   At \( Q_{\text{PM}} \), the firm is profit-maximising because \( MR = MC \). The firm will not produce less than \( Q_{\text{PM}} \) because then \( MR \) would exceed \( MC \) and the firm is missing out on possible profits. The firm won’t produce above \( Q_{\text{PM}} \) because the marginal cost of producing more output than \( Q_{\text{PM}} \) exceeds the marginal revenue, which would reduce total profit.

3. Describe the difference between short-run and long-run ... AND ... explain why new firms will enter the market in the short-run.

   The short-run is the period of time when at least one factor of production is fixed and so firms can’t enter or leave the industry. In the long-run, all resources are variable. Firms outside the industry will enter this market in the long-run to try and earn super-normal profits.
4. Use marginal analysis to fully explain the changes that will occur in the long run to the price AND output in Graphs 2 and 3.

In your answer:

- show the relevant changes to Graph 2 and Graph 3.
- clearly label your changes
- refer to the changes that you made to the graphs in your answer below

In the short-run, firms in this market are earning supernormal profits. This will continue in the short-run as firms are price-takers and new firms can’t enter the market - because at least one factor of production is fixed in the short-run.

However in the long-run all factors of production are variable. Firms outside the industry will enter the market in the long-run to try and earn the supernormal profits earned at Pm.

However, the new firms will increase supply... causing a surplus at P1 (P<sub>m</sub>). Consumers will bid down the price. This will continue until firms earn normal profits and no new firms enter the market.

To profit-maximise, individual firms will respond to the lower price (P<sub>2</sub>) by reducing their output from Q<sub>1m</sub> to Q<sub>2</sub>. 
1. Identify **THREE** characteristics of a perfectly competitive market.

- Perfect knowledge
- Identical product
- Lots of buyers and sellers
- No barriers of entry or exit

2. Explain why one (or more) of the characteristics of a perfectly competitive market result in individual firms being price takers.

- Because all the firms sell an identical product, they can't raise the price over other firms because customers would switch to their competing firms.

3. On Graph 4 above:
   a. **Fully label** the THREE cost curves.
   b. At the current price of $P_1$, **identify** the profit maximising level of output ($Q_e$).
   c. **State** the type of profit being made at the profit maximising output $Q_e$ and shade the appropriate area on the graph.

   Type of profit: **Supernormal**
4. Compare the behaviour of perfectly competitive firm, such as the one shown in Graph 4, in the short-run and the long-run. Your answer should clearly explain the difference between the short-run and the long-run.

| In the long-run all factors of production are variable so firms can enter or leave the market. This contrasts to the short-run when at least one factor of production is fixed. In the short-run firms will continue to produce Qc and earn supernormal profits. In the long-run new firms will enter the market. The price will fall and firms will produce less and earn normal profits. |

5. Show the changes to Graph 4 that will result from the long-run to this perfectly competitive market. Label the long run equilibrium price as \( P_L \) and output as \( Q_L \).

6. Use marginal analysis to explain why the perfectly competitive firm will change its level of output in response to the long-run change in the market price.

Your answer should refer to the changes you have made to Graph 4.

| In the long-run market supply will increase and the price will fall as consumers bid down the price. |
| As price falls, so too does the individual firm’s MR curve. This means that at the old price \( P_1 \) the firm is no longer profit-maximising. The only way it can profit maximise is to decrease output to a new output level \( Q_n \) where \( MR' = MC \). |
| At this price \( P_n \) and output \( Q_n \) the firm now earns normal profits. |
| New firms will no longer enter the market and the price will fall no further. |
Use the Commerce Commission’s criteria to determine whether the following firms are monopolies or not.

1. For each example, decide whether the firm has a functional monopoly and a geographical monopoly. Then decide whether it is a pure or near monopoly ... or not a monopoly at all.
   For each example, you should consider whether the suggested market is accurate or not. You may need to redefine the market before you determine whether the firm is a monopoly or not.

<table>
<thead>
<tr>
<th></th>
<th>Functional Monopoly</th>
<th>Geographical Monopoly</th>
<th>Pure Monopoly</th>
<th>Near Monopoly</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Telecom</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Air New Zealand</td>
<td>... market: international flights to/from NZ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Air New Zealand</td>
<td>... market: plane flights to/from Napier (nb no other commercial airlines fly this route)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. NZ Post</td>
<td>... market: mail delivery in NZ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. NZ Rail</td>
<td>... market: rail transport in NZ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. The Warehouse</td>
<td>... market: bulk retailing in Taupo</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Whakapapa Skifield</td>
<td>... market: skiing on north face of Mt Ruapehu</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. In Taupo, there is one shop that hires suits. For school balls it has a (very) near monopoly on suit hire to school students. Explain why this firm could not charge $1,000 per night for students to hire suits - even though it has almost no competition.

*If the price gets too high, people will find substitutes (eg borrow parents' suits, wear other clothes) or drive further afield (Rotorua) to hire a suit.*
The graphs below show the situations facing a monopolistic firm.

In each of the graphs do the following:

1. Identify the profit-maximising level of output (Q*).
2. Show the market price set by the firm (P*).
3. Show the economic profit.
Answer the following questions:

1. The graph to the right shows a monopolist maximising profit at which output level?
   a. a.
   b. b.
   c. c.
   d. d.

2. With marginal revenue of $10 and marginal cost $12, the profit-maximising firm should . . .
   a. increase output.
   b. decrease output.
   c. leave the output at the present level.
   d. find a more efficient method of production.

3. When comparing the perfect competitor with a monopolist in the same market, which of the following is true?
   a. The monopolist can only make a normal profit in the long-run.
   b. Monopolists are allocatively efficient.
   c. A market of perfect competitors tends to produce less at a higher price than a monopoly market.
   d. A monopoly market tends to produce less at a higher price than perfect competitors.

4. Referring to the graph alongside, if a perfectly competitive market is monopolised and effective barriers to entry exist, there will be an efficiency loss of...
   a. ACI.
   b. BCG.
   c. JBCI.
   d. BCDF.

You have been asked to advise some local businesses. Five firms have come to you for your recommendation on their pricing and output decisions.

1. Use the information provided to say whether the firm should . . .
   - remain at its current (pricing and output) position.
   - increase price and (consequently) reduce output.
   - decrease price and (consequently) increase output.
   - go back and look at its figures – they don’t make sense.

<table>
<thead>
<tr>
<th>Firm</th>
<th>Price ($)</th>
<th>MR ($)</th>
<th>Output</th>
<th>TR ($)</th>
<th>TC ($)</th>
<th>AC ($/unit)</th>
<th>MC ($/unit)</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1.50</td>
<td>1.20</td>
<td>3 000</td>
<td>4 500</td>
<td>4 000</td>
<td>1.50</td>
<td>1.20</td>
<td>Remain</td>
</tr>
<tr>
<td>B</td>
<td>2.00</td>
<td>1.60</td>
<td>5 000</td>
<td>10 000</td>
<td>10 000</td>
<td>2.00</td>
<td>2.00</td>
<td>↑↑↑ &amp; ↑↑↑Q</td>
</tr>
<tr>
<td>C</td>
<td>7.50</td>
<td>6.50</td>
<td>1 000</td>
<td>5 500</td>
<td>5 500</td>
<td>5.50</td>
<td>5.50</td>
<td>↑↑ &amp; ↑↑Q</td>
</tr>
<tr>
<td>D</td>
<td>1.00</td>
<td>1.10</td>
<td>4 000</td>
<td>4 000</td>
<td>2 500</td>
<td>0.63</td>
<td>1.10</td>
<td>redo sums</td>
</tr>
<tr>
<td>E</td>
<td>0.90</td>
<td>0.75</td>
<td>4 000</td>
<td>3 600</td>
<td>3 000</td>
<td>0.75</td>
<td>0.75</td>
<td>remain</td>
</tr>
</tbody>
</table>

2. To help the more visual customers, complete the revenue and cost curve graphs for firms A-C.
But wait, there’s more! What advice will you give the following firms?

A. Firm is now at the correct position.
B. Firm should increase the price and reduce quantity produced.
C. Firm should decrease the price and increase quantity produced.
D. Firm should shutdown operations because loss at the best possible operating position exceeds fixed costs.
E. This is a nonsense case.

<table>
<thead>
<tr>
<th>Firm</th>
<th>Price</th>
<th>MR</th>
<th>Output</th>
<th>TR</th>
<th>TC</th>
<th>Total FC</th>
<th>AC</th>
<th>MC</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>8.00</td>
<td>4.00</td>
<td>2000</td>
<td>16,000</td>
<td>8,000</td>
<td>2000</td>
<td>4.00</td>
<td>3.00</td>
<td>C</td>
</tr>
<tr>
<td>B</td>
<td>5.00</td>
<td>4.00</td>
<td>1000</td>
<td>5000</td>
<td>4000</td>
<td>1000</td>
<td>at min. level 4.00</td>
<td>4.00</td>
<td>A</td>
</tr>
<tr>
<td>C</td>
<td>2.00</td>
<td>less than 2.00</td>
<td>4000</td>
<td>8000</td>
<td>5,200</td>
<td>1000</td>
<td>1.30</td>
<td>2.20</td>
<td>b</td>
</tr>
<tr>
<td>D</td>
<td>8.00</td>
<td>0.00</td>
<td>4000</td>
<td>32000</td>
<td>20000</td>
<td>5000</td>
<td>5.00</td>
<td>4.00</td>
<td>b</td>
</tr>
<tr>
<td>E</td>
<td>1.00</td>
<td>2.00</td>
<td>10000</td>
<td>4000</td>
<td>20000</td>
<td>2000</td>
<td>2.00</td>
<td>2.00</td>
<td>c</td>
</tr>
<tr>
<td>F</td>
<td>3.00</td>
<td>1.60</td>
<td>2000</td>
<td>1800</td>
<td>1000</td>
<td>at min. level 1.60</td>
<td>1.60</td>
<td>a</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>2.50</td>
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<td>10000</td>
<td>30000</td>
<td>4000</td>
<td>3.00</td>
<td>2.00</td>
<td>d</td>
<td></td>
</tr>
</tbody>
</table>

2. Draw the graphs for each of the situations above. Be sure to identify any economic profit.

3. The graph on the right shows a monopolistic market.

On the graph, show:
- the profit-maximising price ($P_{\text{MON}}$)
- the profit-maximising quantity ($Q_{\text{MON}}$)
- the supernormal profit

Also on the graph, show
- the price ($P_{\text{PC}}$) and quantity ($Q_{\text{PC}}$) that would occur if the market was perfectly competitive
- the deadweight loss due to the market being monopolistic
1. On Graph 1 identify and label:
   a. the monopolist’s marginal revenue (MR) curve.
   b. Identify the profit-maximising price ($P_{MON}$) and profit-maximising (loss-minimising) quantity ($Q_{MON}$).
   c. the economic profit the monopolist firm will earn at $Q_{MON}$.

2. Use marginal analysis to explain why the monopolist firm maximises its profit (minimises its loss) at $Q_{MON}$.

   A firm maximises its profit (minimises its losses) when it produces at a quantity where $MC = MR$.

   If it produced below this level, the marginal revenue would exceed marginal cost, and so the firm is missing out on possible profits (by producing more).

   If it produced above this level of output the extra (marginal) cost of producing the goods or services would exceed the marginal (extra) revenue earned, and so total profit would decline.
3. On Graph 1, add an average variable curve (AVC) that would mean the firm decides to shut-down in the short-run.

4. Compare the behaviour of the monopolist in the short-run and the long-run if the market situation and costs of production do NOT change in the long-run.

   The short-run is defined as a period of time in which at least one factor of production (ie cost or resource is fixed). This means the firm is obliged to pay for this resource and so can’t leave the industry.

   An example of such a resource would be a rental agreement, a supply contract, or fixed assets such as land or machinery.

   Therefore in the short-run, assuming the firm is profit-maximising (loss-minimising) its only choice is whether to stay open or shut down.

   In the long-run all costs/resources are variable, so the firm can choose to leave the industry if it is not breaking even.
1. With reference to at least two characteristics of a monopoly, explain what Auckland Airport can be described as a monopoly.

- there is only one firm in the market
- there are very high barriers to entry
- there is a unique product

2. On Graph 2 show and label an average revenue:
   a. draw and label an appropriately placed average revenue (AR) curve for Auckland Airport.
   b. draw and label an appropriately placed average cost (AC) curve, to show Auckland Airport earning a supernormal profit
   c. identify and label the profit-maximising price ($P_{MON}$) and profit-maximising quantity ($Q_{MON}$).
   d. shade in the area of supernormal profit.

3. On Graph 2, identify the deadweight loss that occurs as a result of Auckland Airport being a monopoly.

4. Explain why deadweight loss occurs in a monopolistic market.

The demand curve for Akl Airport is downward-sloping and so MR is below the AR curve. Therefore a monopoly's profit-maximising output ($Q_{MON}$) is below the competitive market equilibrium ($MC = AR$ or $S = D$). Consequently, a monopoly produces less than a competitive market and some producer and consumer surplus is not achieved, i.e., deadweight loss.
5. Use **marginal analysis** to explain why Auckland Airport will produce at the *price* $P_{\text{MON}}$ to maximise its profits.

At $P_{\text{MON}}$, consumers will choose to purchase $Q_{\text{MON}}$ from Auckland Airport. At this output level, the airport is profit-maximising, i.e. $MR = MC$. If it produced less, it would forgo available profit (by producing more). If it produced more the extra or marginal cost of production would be more than the extra or marginal revenue earned by the firm and so it would reduce total profit.

6. Use marginal analysis to explain how Auckland Airport would respond to a change in market demand. You do not have to show your changes on Graph 2. Include in your full explanation:

- the effect on average revenue (AR) and marginal revenue (MR) of an increase in demand for milk products
- what decisions Auckland Airport is likely to make regarding its level of output and the price it charges for milk products
- the use of marginal analysis to explain Auckland Airport’s output and pricing decisions

An increase in demand for landing rights in Auckland is shown by an increase of the AR curve. This results in the MR curve also shifting outwards to the right.

Consequently, the firm is no longer profit-maximising at $Q_{\text{MON}}$ as $MC > MR$. The airport will respond by increasing output to $Q'_{\text{MON}}$.

This will result in the price rising to the new $P'_{\text{MON}}$ due to the increase in the AR curve.
1. On Graph 3 above:
   a. Identify the profit maximising output as \( Q_{\text{MON}} \) and the profit-maximising price as \( P_{\text{MON}} \).
   b. Add an average cost curve (AC) showing the monopoly earning normal profits at the profit maximising output \( Q_{\text{MON}} \).

2. Use marginal analysis to explain why the firm maximises its profits by producing at \( Q_{\text{MON}} \).

   **At** \( Q_{\text{Mon}} \) **the monopolist is maximising its profit because**
   \[ MR = MC \]

   **If** the firm produced less than \( Q_{\text{Mon}} \) **then** \( MR \) **would be below** \( MC \) **and the monopolist is missing out on potential profits and hence would not maximise its profits**.

   **Alternatively** the firm could produce more than \( Q_{\text{Mon}} \) **but the marginal cost of producing these goods exceeds the extra revenue the monopolist would get from selling them. Therefore producing more would reduce total profit. So the best level of output is at** \( Q_{\text{Mon}} \) **where** \( MR = MC \).
3. On Graph 3 show the price \( (P_{PC}) \) and quantity \( (Q_{PC}) \) that would occur in the market if it was perfectly competitive.

4. Identify the deadweight loss that occurs in a monopolistic market.

5. Compare and contrast the market outcomes depending on whether the market is perfectly competitive or monopolistic. Your answer should clearly refer to...
   - the equilibrium price and quantity
   - the allocative efficiency of the market
   - the impact on producers and consumers

... depending on whether the market is monopolistic or perfectly competitive.

In theory a perfectly competitive market is better economically than a monopoly.

A monopolistic firm faces a downward sloping demand \((AP)\) curve. This means that \(MC\) is below the \(AP\) and the monopolist’s profit-maximising level of output \((Q_M)\) is below the competitive equilibrium \((AR=MC, D=S)\).

As the graph shows, the result of this is that a monopolist will produce less than a perfectly competitive market. And the price will be higher in the monopoly than in the perfectly competitive market.

A monopoly will also result in a loss of allocative efficiency, ie deadweight loss. This happens because the profit-maximising level of output is below the perfectly competitive market equilibrium, and so some producer and consumer surplus is lost, ie deadweight loss.
The graph below shows a natural monopoly. Study the graph and answer the questions below.

1. Explain how the graph above shows this industry is a natural monopoly.

   *Average cost is falling through the relevant range of demand*

2. Identify the level of profit-maximising (loss-minimising) output \((Q_{pm})\) and price \((P_{pm})\).

3. What is the firm’s economic profit (loss) at this level of output? $30 million \(= 6 \text{ million} \times \$5\)

4. Add an average variable cost (AVC) curve that would result in the monopoly NOT shutting down in the long-run.

5. Show an increase in demand that will result in the firm earning a supernormal profit in the long-run.

6. Use marginal analysis to explain how the firm will respond to the long-run increase in demand.

   *The increase in demand \((AR)\) will increase marginal revenue. This means that the firm is no longer profit-maximising at \(Q_{pm}\)*

   *The monopolist will respond by increasing its output to a new profit-maximising level of output.*
Identify whether the following markets are examples of natural monopolies or not:

<table>
<thead>
<tr>
<th>Market</th>
<th>Natural Monopoly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ports of Auckland</td>
<td>YES</td>
</tr>
<tr>
<td>Auckland Airport</td>
<td>YES</td>
</tr>
<tr>
<td>NZ Rail</td>
<td>YES</td>
</tr>
<tr>
<td>Air New Zealand (International Travel)</td>
<td>YES</td>
</tr>
<tr>
<td>Fonterra</td>
<td>YES</td>
</tr>
</tbody>
</table>

2. The following graph shows a natural monopoly.
   a) Add an average cost (AC) curve that identifies the graph as one for a natural monopoly.

   ![Graph of Revenue & Costs](image)

   b) Show the profit-maximising (loss-minimising) level of output \(Q_{NAT}\) and price \(P_{NAT}\).

   c) Shade and label any economic profit that occurs at \(Q_{NAT}\).

3. On the graph below, add an appropriate average revenue (AR) and marginal revenue (MR) curve that shows a natural monopoly earning a supernormal profit.

   ![Graph of Revenue & Costs](image)
Answer the multiple choice questions below:

1. A natural monopoly is one that . . .
   a. is required by regulators to earn zero profit.
   b. gets its market power from the ownership of patents.
   c. has economies of scale over the entire market.
   d. is unable to cover its costs, no matter what price is charged.

2. Natural monopolies are different to other monopolies in that they . . .
   a. are imperfect competitors.
   b. are sole producers of organic products.
   c. can determine price and output but not both at the same time.
   d. have downward sloping average cost curves in the relevant output range.

3. Which of the following is most likely to be a cause of a natural monopoly?
   a. Government regulation or ownership.
   b. Supernormal profits.
   c. High start-up costs.
   d. Climate.

4. Which is the typical feature of a natural monopoly?
   a. Higher prices occur compared with perfect competition.
   b. Diminishing returns does not apply in this industry.
   c. The profit maximising level of output is allocatively efficient.
   d. Economies of scale occur over the entire market size.

5. Which is the closest to a natural monopoly in New Zealand?
   a. Auckland Airport.
   b. Vodafone.
   c. Air New Zealand.
   d. The Starship Hospital in Auckland.

6. A key feature of a natural monopoly is that . . .
   a. one firm can supply the entire market at lower prices than any two or more firms.
   b. it will be state-owned.
   c. it must always earn supernormal profits.
   d. it will always produce at a level of output where P = MC.

7. The Government may allow a natural monopoly to occur because . . .
   a. as the majority shareholder, it will earn a supernormal profit.
   b. without statutory protection, private firms may refuse to invest in important infrastructure.
   c. the monopoly will have lower costs than a competitive market and so produce more goods.
   d. it is not the role of government to punish firms who are successful.

8. Identify and describe the three ways that a government can regulate a natural monopoly:
   a) ________________________________________________________________________________________________
   ________________________________________________________________________________________________
   ________________________________________________________________________________________________
   b) ________________________________________________________________________________________________
   ________________________________________________________________________________________________
   ________________________________________________________________________________________________
   c) ________________________________________________________________________________________________
   ________________________________________________________________________________________________
   ________________________________________________________________________________________________
The following graph shows a natural monopoly.

1. Show the natural monopoly’s profit-maximising price \( P_1 \) and quantity \( Q_1 \).

2. Shade and label the natural monopoly’s economic profit.

3. Explain why the government may choose to intervene in this market by regulating the price.

   The monopolist is producing less than the competitive market equilibrium, and charging a higher price. Because competition can’t occur to resolve this, the government may intervene by regulating the price.

4. Show the price \( P_2 \) be charged to consumers, and the resulting market quantity \( Q_2 \) if the government implemented an average-cost pricing regime.

5. Show the price \( P_3 \) be charged to consumers, and the resulting market quantity \( Q_3 \) if the government implemented a marginal-cost pricing regime.

6. Describe what the government would need to do to support the firm, to keep the marginal-cost pricing regime in place.

   The government must either subsidise the firm to cover its subnormal profit or allow the firm to charge a compulsory fixed tariff (charge) to cover the subnormal profit.
Use the following graph to compare and contrast the different types of government intervention in a natural monopoly.

1. Show the natural monopoly’s profit-maximising price ($P_1$) and quantity ($Q_1$).

2. Shade and label the natural monopoly’s economic profit.

3. Show the price ($P_2$) be charged to consumers, and the resulting market quantity ($Q_2$) if the government implemented an average-cost pricing regime.

4. Show the price ($P_3$) be charged to consumers, and the resulting market quantity ($Q_3$) if the government implemented a differential tariff, or two-part pricing regime.

5. Shade in the following on the graph above:

   - [ ] variable charge
   - [ ] fixed charge

6. Explain how the average-cost pricing regime improves allocative efficiency in the market. Your answer should clearly identify the changes to consumer and/or producer surplus.

   By imposing an average-cost pricing regime on the natural monopolist, the market moves closer towards the competitive market equilibrium. Quantity increases and price decreases.

   This increases the consumer and producer surplus in the market and so increases (improves) allocative efficiency in the market.
1. Using Electricorp as an example, define what is meant by the term ‘natural monopoly’.

A natural monopoly is a market where one firm such as Electricorp can supply the market more cheaply than two or more firms. Ownership of all power stations gave Electricorp an insurmountable cost advantage over any possible competitor.

Graph 1: The New Zealand Wholesale Electricity Market

2. On Graph 1, draw an appropriate average cost curve (AC) to show Electricorp as a natural monopoly.

3. Show the profit maximising quantity $Q_{ELECTRICORP}$ and profit maximising price $P_{ELECTRICORP}$.

4. Because Electricorp was government-owned, the government was able to regulate the price that Electricorp charged its customers. The government did this by requiring Electricorp to set the price at a level that would occur if the wholesale market was perfectly competitive.

Show this price ($P_{REG}$) and the resulting quantity ($Q_{REG}$) on the graph above.

5. Shade the subnormal profit that Electricorp suffered as a result of charging at $P_{REG}$.
6. Explain how requiring Electricorp to produce at a price where it earns a subnormal profit is effectively the same as applying a differential tariff to a natural monopoly.

Because Electricorp was government-owned, any financial loss had to be paid for by taxpayers, just as a subsidy is paid by taxpayers.

Therefore in effect Electricorp earning subnormal profits is the same as subsidising the firm.

7. An alternative government policy would be to require the firm to set its price at a level that matches its average cost of production, i.e. at its break-even point. Show this price ($P_{AC}$) and quantity ($Q_{AC}$) on Graph 1.

8. Compare the two different government policies to regulate the wholesale electricity market in New Zealand. Your answer should clearly refer to:

- the impact on producers and consumers
- the impact on the government and taxpayers
- any impact on allocative efficiency in the market
- any flow-on effects to the rest of the New Zealand economy

In a natural monopoly, it can be good for the economy to only have one firm because it can supply the market more cheaply than a competitive market. However, the monopolist can restrict output to a level below what consumers would ideally want and charge a higher price.

Therefore the government might regulate the price to lower prices for customers and increase output.

One option is AC pricing. This increases market output and lowers the price. Consequently it reduces, but doesn’t fully eliminate, deadweight loss. Because the firm earns a normal profit, this pricing regime costs the government nothing (e.g. to subsidise production).

A second option is MC pricing. This gets the monopolist to produce at the output level that would occur in a competitive market, i.e. where $S(MC) = D(AR)$. Output is higher and price is lower than with AC pricing. And deadweight loss is fully gone. However the firm is earning subnormal profit, so the government must subsidise the firm or allow a fixed charge to cover the subnormal profit.
1. On Graph 2 above, draw an appropriately positioned average cost curve (AC) for a firm that is a natural monopoly.

2. On Graph 2, identify:
   a. the natural monopoly’s profit maximising level of output as $Q_1$.
   b. the natural monopoly’s profit maximising price as $P_1$.
   c. the deadweight loss that would result if the natural monopoly produces at $P_1$.

3. Use marginal analysis to explain why the natural monopoly will not produce more than $Q_1$.

   The monopolist will aim to profit maximise which occurs at $Q_1$, because $MR = MC$. Producing more than this will result in the marginal cost exceeding the marginal revenue and reducing the firm’s total profit. So it won’t produce more than $Q_1$.

4. On Graph 2, identify:
   a. the socially desirable level of output as $Q_2$.
   b. the socially desirable price as $P_2$. 

   $MC = AR$
5. Explain why the profit maximising level of output is less socially desirable than producing at $Q_s$.

$Q_s$ represents the equilibrium of a perfectly competitive market. At the level of output market demand would equal market supply and so consumer and producer surplus would be maximised. This is allocatively efficient. Any level of output below this reduces consumer and producer surplus, and results in deadweight loss.

6. To get the market closer to the socially desirable level of output, the government could impose average-price controls, i.e. set the price at a level where average revenue (AR) equals average cost (AC), i.e. the natural monopoly’s break-even point.

Show the price ($P_2$) and quantity ($Q_2$) that would result from this government policy.

7. Show the change to consumer surplus as a result of the government requiring the firm to charge $P_2$ to consumers, rather than the profit-maximising price $P_3$ + output.

8. Evaluate the effectiveness of average-cost price controls as a government policy to improve resource allocation in markets controlled by natural monopolies. Your answer should clearly compare the average-cost price controls to either no regulation or other regulations.

The average-cost price control improves the allocative efficiency in the market. It increases the consumer surplus (as well as leading to price falling and output rising) and so improves allocative efficiency.

The policy is also effective as it allows the monopolist to earn a normal profit.

The government could impose a marginal-cost price control. This would get the market to the socially desirable output level, but would result in the firm earning a sub-normal profit. This requires the government to subsidise the firm (to cover the loss) or allow the firm to charge a two-part tariff.