3 c The graph touches the x-axis at -4, indicating a squared factor \((x + 4)^2\).

The other x-intercept is 3,

so  \(y = a(x + 4)^2(x - 3)\).

But when  \(x = 0\),  \(y = -12\)

\[\therefore a(4)^2(-3) = -12\]

\[\therefore a = \frac{1}{4}\]

So,  \(y = \frac{1}{4}(x + 4)^2(x - 3)\)
10  a  The graph touches the x-axis at 120, and cuts the x-axis at 0 and 200.

\[ h(x) = \frac{-x(x - 120)^2(x - 200)}{k}, \quad k \neq 0 \]

So, \( a = 120 \) and \( b = 200 \).

b  When \( x = 100, \ h(x) = 4 \)

\[ 4 = \frac{(-100)(100 - 120)^2(100 - 200)}{k} \]

\[ = \frac{4000000}{k} \]

\[ \therefore 4k = 4000000 \]

\[ \therefore k = 1000000 \]

page 240  EXERCISE 7G Question 4  a, should read:

\[ \cos 2\theta \cos \theta + \sin 2\theta \sin \theta \]

\[ = \cos(2\theta - \theta) \]

\[ = \cos \theta \]

b  \[ \sin 2A \cos A + \cos 2A \sin A = \sin(2A + A) \]

\[ = \sin 3A \]

page 488  EXERCISE 15C Question 3  e, sign diagram should be:

\[ f(x) = \frac{2}{\sqrt{x}} = 2x^{-\frac{1}{2}} \]

\[ \therefore f'(x) = -x^{-\frac{3}{2}} = -\frac{1}{x^{\frac{3}{2}}} \]

which has sign diagram

So, \( f(x) \) is only defined for \( x > 0 \).
\( f(x) \) is never increasing, but is decreasing for \( x > 0 \).

page 492  EXERCISE 15D Question 5  d, sign diagram should be:

\[ f(x) = x^4 - 2x^2 \]

\[ \therefore f'(x) = 4x^3 - 4x \]

\[ = 4x(x^2 - 1) \]

\[ = 4x(x + 1)(x - 1) \]

which has sign diagram

Now \( f(-1) = -1, \ f(1) = -1, \ f(0) = 0, \) so there are local minima at \((-1, -1)\) and \((1, -1)\), and a local maximum at \((0, 0)\).
5 \( e \) \( f(x) = x^3 - 6x^2 + 12x + 1 \)
\[
\therefore \quad f'(x) = 3x^2 - 12x + 12
\]
\[
= 3(x^2 - 4x + 4)
\]
\[= 3(x - 2)^2 \]
which has
sign diagram

Now \( f(2) = 9 \), so there is a stationary
inflection at \((2, 9)\).

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page 508 EXERCISE 15F Question 5 c, sign diagram should be:

\[
\frac{dA}{dr} = 4\pi r - 2000r^{-2} \\
= 4\pi r - \frac{2000}{r^2} \\
\frac{dA}{dr} = 0 \quad \text{when} \quad 4\pi r - \frac{2000}{r^2} = 0 \\
\therefore 4\pi r = \frac{2000}{r^2} \\
\therefore 4\pi r^3 = 2000 \\
\therefore r^3 = \frac{500}{\pi} \\
\therefore r = \sqrt[3]{\frac{500}{\pi}} \approx 5.42
\]

\[
\frac{dA}{dr} \quad \text{has sign diagram}
\]

page 509 EXERCISE 15F Question 6 b, sign diagram should be:

\[
V'(x) \quad \text{has sign diagram}
\]

page 520 EXERCISE 15F Question 12 c, sign diagram should be:

\[
C(x) = 2x^2 + \frac{8}{x} = 2x^2 + 8x^{-1} \\
\therefore C'(x) = 4x - 8x^{-2} = 4x - \frac{8}{x^2} \\
C'(x) = 0 \quad \text{when} \quad 4x - \frac{8}{x^2} = 0 \\
\therefore 4x = \frac{8}{x^2} \\
\therefore 4x^3 = 8 \\
\therefore x^3 = 2 \\
\therefore x = \sqrt[3]{2}
\]

\[
C'(x) \quad \text{has sign diagram}
\]

The following errata were made on 31/Oct/2019

pages 166-168 EXERCISE 5D.2 Question 2, diagrams should distinguish calculator answers (using green):

\[
\cos \theta = -\frac{1}{\sqrt{2}} \\
\text{Using technology,} \\
\cos^{-1}(-1) \approx 1.82 \\
\therefore \theta \approx 1.82 \quad \text{or} \quad 2\pi - 1.82 \\
\therefore \theta \approx 1.82 \quad \text{or} \quad 4.46
\]

\[
\sin \theta = 0 \\
\therefore \sin^{-1}(0) = 0 \\
\therefore \theta = 0 \quad \text{or} \quad \pi - 0 \quad \text{or} \quad 2\pi \\
\therefore \theta = 0, \pi, \text{or} \ 2\pi
\]
\[
\tan \theta = -3.1 \\
\text{Using technology,} \\
\tan^{-1}(-3.1) \approx -1.26
\]

But \(0 \leq \theta \leq 2\pi\)

\(\therefore \theta \approx \pi - 1.26 \) or \(2\pi - 1.26\)

\(\therefore \theta \approx 1.88 \) or \(5.02\)

\[
\tan \theta = 1.2 \\
\text{Using technology,} \\
\tan^{-1}(1.2) \approx 0.876
\]

\(\therefore \theta \approx 0.876 \) or \(\pi + 0.876\)

\(\therefore \theta \approx 0.876 \) or \(4.02\)

\[
\sin \theta = \frac{1}{11} \\
\text{Using technology,} \\
\sin^{-1}\left(\frac{1}{11}\right) \approx 0.0910
\]

\(\therefore \theta \approx 0.0910 \) or \(\pi - 0.0910\)

\(\therefore \theta \approx 0.0910 \) or \(3.05\)

\[
\sin \theta = -\frac{\sqrt{2}}{\sqrt{3}} \\
\text{Using technology,} \\
\sin^{-1}\left(\frac{-\sqrt{2}}{\sqrt{3}}\right) \approx -0.685
\]

But \(0 \leq \theta \leq 2\pi\)

\(\therefore \theta \approx \pi + 0.685 \) or \(2\pi - 0.685\)

\(\therefore \theta \approx 3.83 \) or \(5.60\)

\[
\sin \theta = -0.421 \\
\text{Using technology,} \\
\sin^{-1}(-0.421) \approx -0.435
\]

But \(0 \leq \theta \leq 2\pi\)

\(\therefore \theta \approx \pi + 0.435 \) or \(2\pi - 0.435\)

\(\therefore \theta \approx 3.58 \) or \(5.85\)

\[
\cos \theta = 0.7816 \\
\text{Using technology,} \\
\cos^{-1}(0.7816) \approx 0.674
\]

\(\therefore \theta \approx 0.674 \) or \(2\pi - 0.674\)

\(\therefore \theta \approx 0.674 \) or \(5.61\)

\[
\cos \theta = -\frac{1}{\sqrt{3}} \\
\text{Using technology,} \\
\cos^{-1}\left(-\frac{1}{\sqrt{3}}\right) \approx 2.19
\]

\(\therefore \theta \approx 2.19 \) or \(2\pi - 2.19\)

\(\therefore \theta \approx 2.19 \) or \(4.10\)
The following errata were made on 23/Oct/2019

page 68 EXERCISE 2H Question 8 b. should show shape of quadratic:

8 b Rectangle ABCD has area $A = xy$
   \[ A = x(6 - \frac{3}{4}x) \]
   \[ = -\frac{3}{4}x^2 + 6x \]
   which is a quadratic with $a < 0$, so its shape is

   The area is maximised when
   \[ x = \frac{-b}{2a} = \frac{-6}{2(-\frac{3}{4})} = 4 \]
   and when $x = 4$, $y = 6 - \frac{3}{4}(4) = 3$

   So, the dimensions of rectangle ABCD of maximum area are 4 cm $\times$ 3 cm.

page 160 EXERCISE 5C Question 7 c. diagram should show labels:

7 c The diagram shows P reflected in the y-axis to $P'$, so $P'O'B = POA = \theta$, and $P'$ has coordinates $(\cos \theta, \sin \theta)$.

But $\angle OBP' = 180^\circ - \theta$

$\{PO' + PP'O = 180^\circ\}$, so $P'$ has coordinates $(\cos(180^\circ - \theta), \sin(180^\circ - \theta))$.

$\therefore \sin(180^\circ - \theta) = \sin \theta$

$\{\text{equating y-coordinates of } P'\}$

page 161 EXERCISE 5C Question 8 c. diagram should show labels:

8 c The diagram shows P reflected in the y-axis to $P'$, so $P'O'B = POA = \theta$, and $P'$ has coordinates $(\cos \theta, \sin \theta)$.

But $\angle OBP' = 180^\circ - \theta$

$\{PO' + PP'O = 180^\circ\}$, so $P'$ has coordinates $(\cos(180^\circ - \theta), \sin(180^\circ - \theta))$.

$\therefore \cos(180^\circ - \theta) = -\cos \theta$

$\{\text{equating x-coordinates of } P'\}$
**EXERCISE 5D.2** Question 2 d, should have correct diagram:

\[ \sin \theta = -0.421 \]

Using technology, \( \sin^{-1}(-0.421) \approx -0.435 \)

But \( 0 \leq \theta \leq 2\pi \)

\[ \therefore \theta \approx \pi + 0.435 \text{ or } 2\pi - 0.435 \]

\[ \therefore \theta \approx 3.58 \text{ or } 5.85 \]

---

**EXERCISE 10B** Question 14 a, should read:

<table>
<thead>
<tr>
<th>Month</th>
<th>Cars</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5 cars</td>
</tr>
<tr>
<td>2</td>
<td>18 + 13 = 31 cars</td>
</tr>
<tr>
<td>3</td>
<td>44 + 13 = 57 cars</td>
</tr>
<tr>
<td>4</td>
<td>31 + 13 = 44 cars</td>
</tr>
<tr>
<td>5</td>
<td>44 + 13 = 57 cars</td>
</tr>
<tr>
<td>6</td>
<td>57 + 13 = 70 cars</td>
</tr>
</tbody>
</table>

**EXERCISE 10F.2** Question 7, should read:

Let the terms of the geometric series be \( t_1, t_1r, t_1r^2, \ldots \)

Then \( t_1r = \frac{8}{5} \)

\[ \therefore t_1 = \frac{8}{5r} \ldots (1) \]

\[ \therefore t_1 = 10 - 10r \ldots (2) \]

Equating (1) and (2), \( \frac{8}{5r} = 10 - 10r \)

\[ \therefore 8 = 50r - 50r^2 \]

\[ \therefore 50r^2 - 50r + 8 = 0 \]

\[ \therefore 2(5r^2 - 25r + 4) = 0 \]

\[ \therefore 2(5r - 1)(5r - 4) = 0 \]

\[ \therefore r = \frac{1}{5} \text{ or } \frac{4}{5} \]

Using (2), if \( r = \frac{1}{5} \), \( t_1 = 10 - 10\left(\frac{1}{5}\right) = 8 \)

if \( r = \frac{4}{5} \), \( t_1 = 10 - 10\left(\frac{4}{5}\right) = 2 \)

\[ \therefore \text{ either } t_1 = 8, \ r = \frac{1}{5} \text{ or } t_1 = 2, \ r = \frac{4}{5}. \]