Student No. | | | | | | | | | |

Name: _____

Class: 11MTA_____

CHERRYBROOK TECHNOLOGY HIGH SCHOOL

2020

YEAR 11

AP2

MATHEMATICS ADVANCED

Time allowed – 2 hours plus 10 minutes reading time

General Instructions

- Attempt all questions
- Write your name and student number on the question paper
- Write using black pen
- NESA approved calculators may be used
- The NESA reference sheet has been provided
- For questions in Section II, show relevant mathematical reasoning and/or calculations

Total marks: 65

Section I – 10 marks (pages 2 – 4)

- Attempt Questions 1-10
- Allow about 15 minutes for this section

Section II – 55 marks (pages 5 – 18)

- Attempt Questions 11-26
- Allow about 1 hour and 45 minutes for this section

Section I

10 marks

Attempt Questions 1–10

Allow about 15 minutes for this section

Use the multiple-choice answer sheet for Questions 1–10.

---

1. What is the value of $f(2a+1)$ if $f(x) = 3x - 2$

A. $6a - 2$

B. $6a - 1$

C. $6a + 1$

D. $6a + 2$

2. The line $5x - y - 4 = 0$ passes through the point $(k, 26)$. What is the value of k?

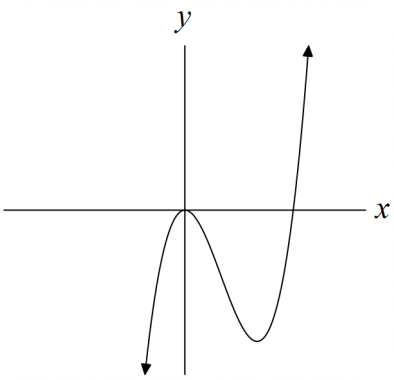
A. 3

B. 4

C. 5

D. 6

3. What type of relation is shown by the graph below?



A. One - to - One

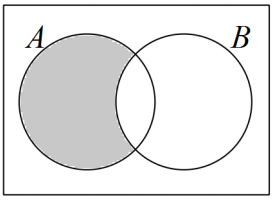
B. One - to - Many

C. Many - to - One

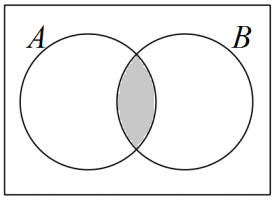
D. Many - to - Many

4. Which of the Venn diagrams shows $A \cap B'$ shaded?

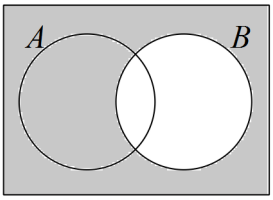
A.



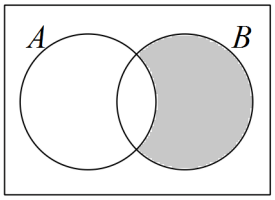
B.



C.



D.



5. The probability distribution for the random variable X is shown below.

x	2	3	4	5	6	7	8
$P(X = x)$	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{3}{16}$	$\frac{1}{8}$	$\frac{1}{16}$

What is $P(3 < X \leq 7)$?

A. $\frac{1}{2}$

B. $\frac{5}{8}$

C. $\frac{3}{4}$

D. $\frac{7}{8}$

6. Solve $|x - 3| - 8 = 0$

A. $x = 11$

B. $x = 5$ or $x = -11$

C. $x = -5$ or $x = 11$

D. $x = 5$ or $x = 11$

7. Which of the following is true for the quadratic equation $3x^2 + x + 4 = 0$?

A. The roots are rational

B. There are no real roots

C. The roots are equal

D. The roots are irrational

8. A sector has an angle of $\frac{\pi}{3}$ subtended at the centre of a circle. The radius is $6\ cm$.

The exact area of the sector is?

A. $\pi\ cm^2$

B. $3\pi\ cm^2$

C. $6\pi\ cm^2$

D. $12\pi\ cm^2$

9. A function is defined as $g(x) = 12x^3 - 8x + 14$

Evaluate $g'(-2)$.

A. -152

B. -66

C. 136

D. 150

10. The variance of a discrete random variable X is $Var(X) = 5.01$

Calculate $Var(5X - 2)$

A. 25.05

B. 26.05

C. 125.25

D. 126.25

End of Section I

Section II

55 marks

Attempt Questions 11 – 26

Allow about 1 hour and 45 minutes for this section

- Answer the questions in the spaces provided. These spaces provide guidance for the expected length of response.
- Your responses should include relevant mathematical reasoning and/or calculations.
- Extra writing space is provided at the back of this booklet. If you use this space, clearly indicate which question you are answering.

Question 11

(a) Express $(2\sqrt{3}+1)(2-\sqrt{3})$ in the form of $a+b\sqrt{3}$ where a and b are integers. **2**

.....

.....

.....

.....

(b) Show algebraically that $f(x)=\dfrac{2x}{x^2+3}$ is an odd function. **2**

.....

.....

.....

.....

.....

.....

.....

(c) Rewrite the following expression without any negative or fractional indices. **2**

$$\left(\frac{12x^{-3}y^{2}}{xyz^{\frac{1}{2}}}\right)^{2}$$

.....

.....

.....

.....

.....

.....

.....

Question 12

If $f(x) = x^2$ and $g(x) = 2x + 1$:

(a) Find the composite function $f(g(x))$ **1**

.....

.....

.....

.....

(b) What is the domain and range of the composite function $f(g(x))$? **2**

.....

.....

.....

.....

Question 13

Differentiate $f(x) = 2x^2 - x + 3$ from first principles. **3**

Question 14

Differentiate with respect to x:

(a) $4x^{-3}$ **1**

.....

.....

.....

(b) $y = (5 + 2x^2)^{\frac{1}{2}}$ **2**

.....

.....

.....

.....

.....

.....

.....

.....

Question 15

A circle is given by the equation $x^2 + y^2 + 6x - 12y = 19$ **3**

What is the centre and radius of this circle?

.....

.....

.....

.....

.....

.....

.....

.....

Question 16

(a) If $f(x) = \frac{x^2-4}{2x+5}$ show that $f'(x) = \frac{2(x+4)(x+1)}{(2x+5)^2}$ **3**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(b) Hence, or otherwise, find the equation of the tangent to $f(x) = \frac{x^2-4}{2x+5}$ at the point $\left(1, \frac{-3}{7}\right)$. **3**
Give your answer in general form.

.....

.....

.....

.....

.....

.....

.....

.....

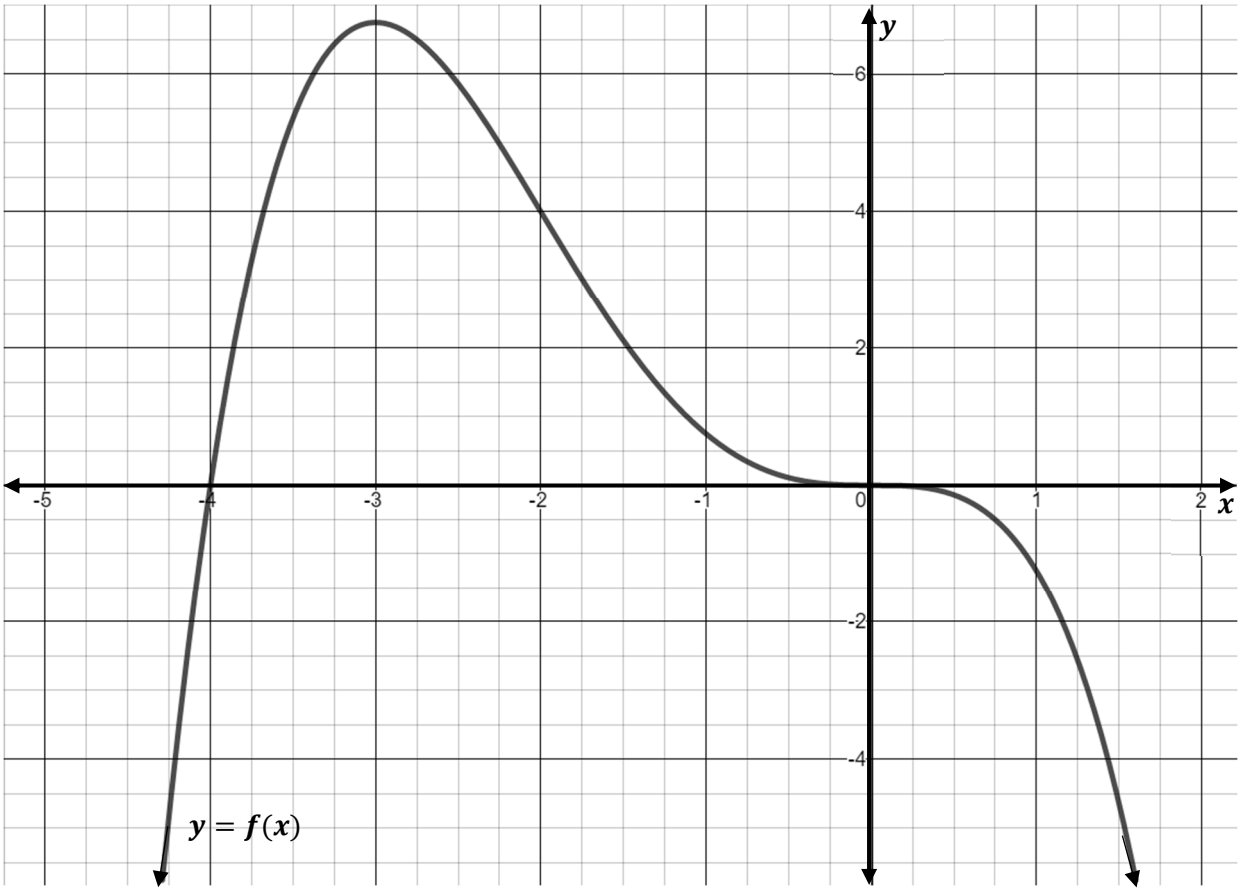
.....

.....

.....

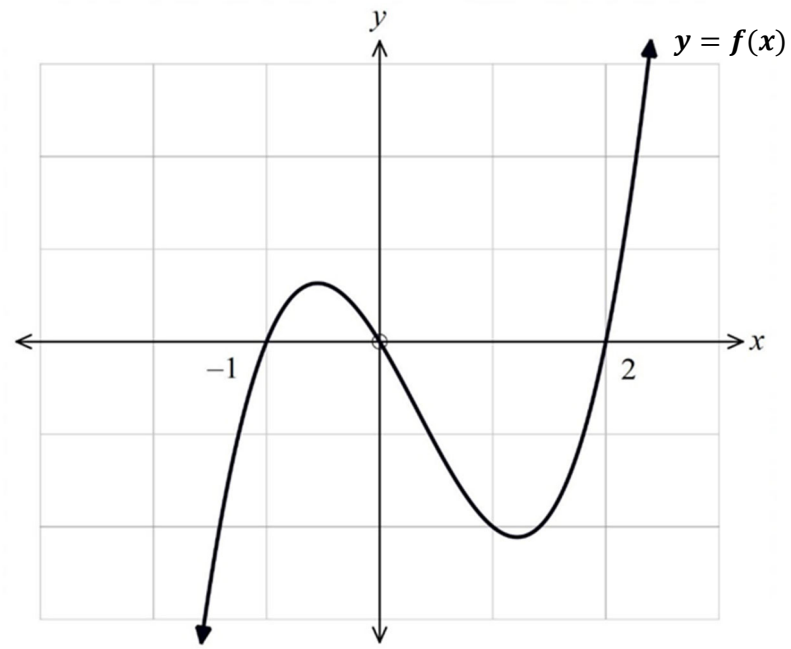
(c) The graph below shows the graph of $y = f(x)$. **2**

On the same set of axes sketch the gradient function.

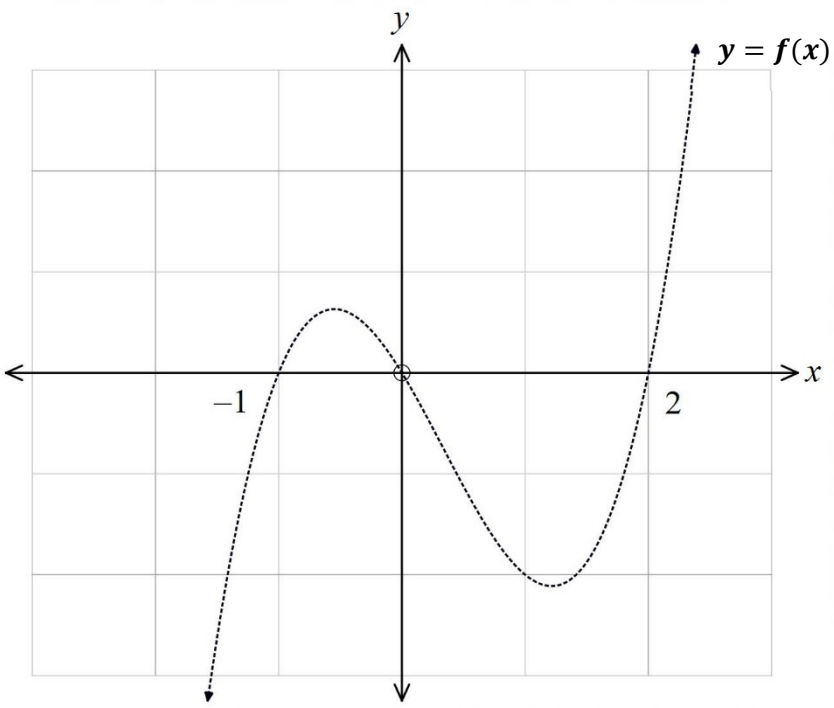


Question 17

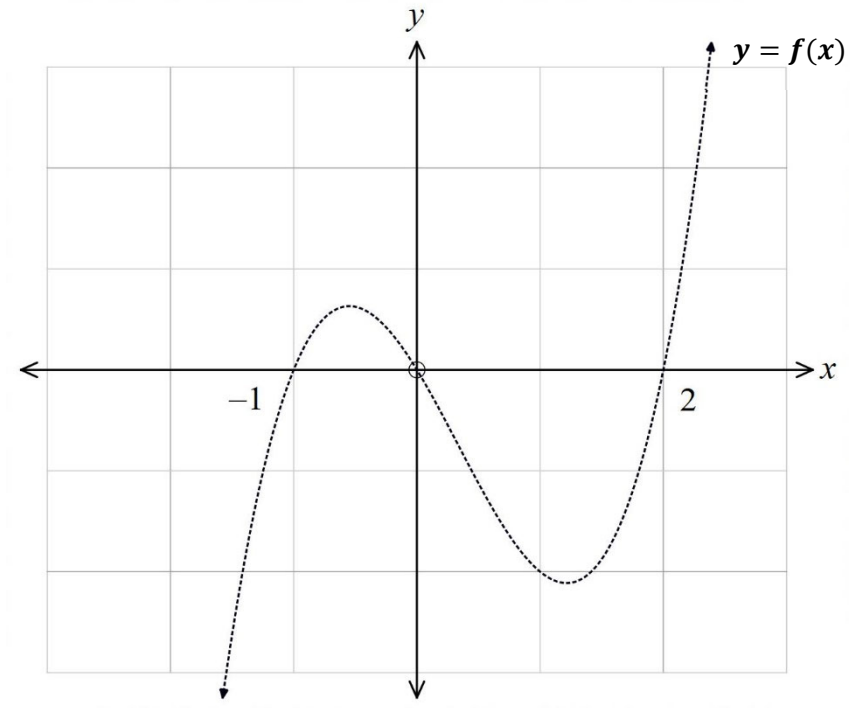
The sketch of $y = f(x)$ is shown below.



(a) Use the graph of $y = f(x)$ to draw a neat sketch of $y = -f(x)$ on the diagram below. **1**



(b) Use the graph of $y = f(x)$ to draw a neat sketch of $y = -f(-x)$ on the diagram below. **1**



Question 18

(a) Convert $\frac{11\pi}{12}$ to degrees. **1**

. . . . . .

. . . . . .

(b) Find the exact value of tan 330° **2**

. . . . . .

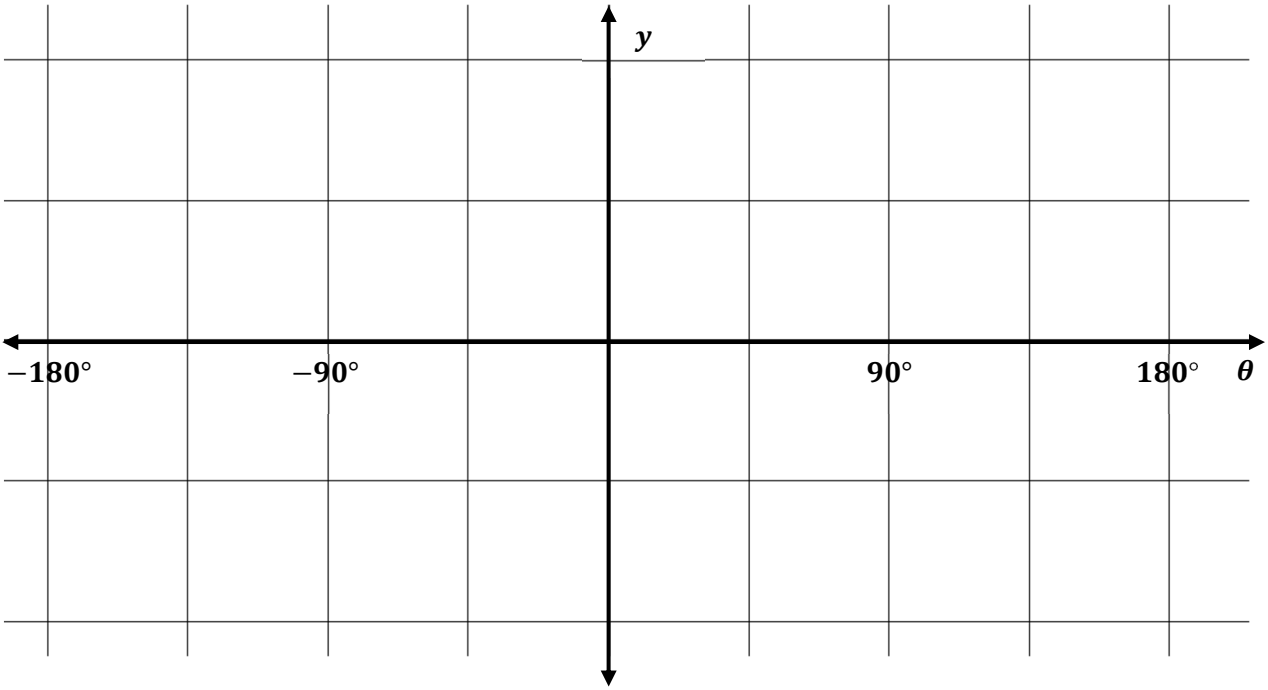
. . . . . .

. . . . . .

. . . . . .

Question 19

Sketch the graph of $y = 2\sin\theta$ over the domain $\theta \in [-180°, 180°]$ **2**



Question 20

Determine the value(s) of θ for $2\cos\theta + 1 = 0$ over the domain $\theta \in [0, 4\pi]$ **3**

.....

.....

.....

.....

.....

.....

.....

.....

.....

Question 21

The probability distribution of a random variable X is shown below **2**

x	−2	−1	0	1	2
$P(X = x)$	0.1	a	0.2	0.2	a

Calculate the value of a.

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

Question 22

Jasmine is planting flowers in her garden. The probability that an individual flower survives is 0.35. Jasmine plants 5 flowers. **2**

What is the probability that at least one flower survives? Answer correct to two decimal places.

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

Question 23

In a game of chance, Mr Mathface tosses 2 coins. He wins \$10 for 2 heads, \$5 for 2 tails and nothing for a head and a tail.

(a) Use a tree diagram to complete the probability distribution table below for the game of chance. **2**

x	\$0	\$5	\$10
$P(X = x)$			

(b) Determine the expected value of this game **1**

. . . . . .

. . . . . .

. . . . . .

. . . . . .

(c) If the game costs \$4 to play, would Mr Mathface expect to win or lose money in the long term? Justify your answer with suitable calculations. **2**

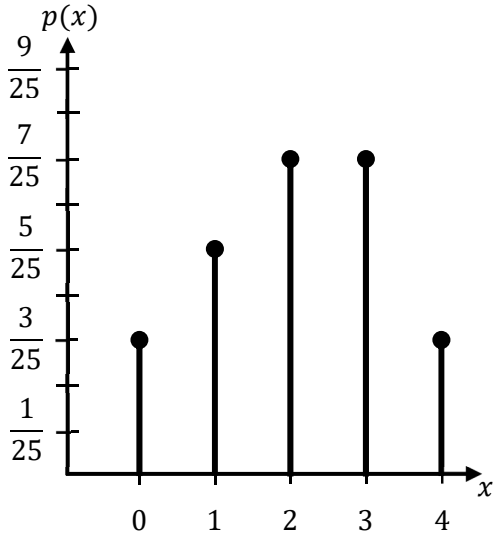
. . . . . .

. . . . . .

. . . . . .

Question 24

The probability distribution of a discrete random variable X is shown below. **2**



Given that $\mathrm{E(X)} = 2.08$ calculate the variance, $Var(\mathrm{X})$.

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

Question 25

Four identical balls numbered $1, 2, 3$ and 4 are placed into a box.

A ball is randomly drawn from the box and not returned to the box.

A second ball is then randomly drawn from the box.

(a) What is the probability that the first ball drawn is numbered 4 and the second ball drawn is numbered 1? **1**

.....

.....

.....

.....

.....

.....

.....

(b) What is the probability that the sum of the two numbers on the two balls is 5? **1**

.....

.....

.....

.....

.....

.....

.....

(c) Given that the sum on the two balls is 5, what is the probability that the second ball drawn is a number 1? **1**

.....

.....

.....

.....

.....

Question 26

The displacement of a particle moving in a straight line is given by: **5**

$$x = 9t^2 - t^4$$

where x is the displacement from the origin in metres and t is the time in seconds, for $t > 0$.

Sketch the displacement time graph and then determine the total distance travelled in the first 3 seconds.

End of Paper

Section II Extra writing space

If you use this space, clearly indicate which question you are answering.

Section II Extra writing space

If you use this space, clearly indicate which question you are answering.

Student No. | | | | | | | | | |

Name: _____

Class: 11MTA_____

CHERRYBROOK TECHNOLOGY HIGH SCHOOL

2020

YEAR 11

AP2

MATHEMATICS ADVANCED

Time allowed – 2 hours plus 10 minutes reading time

General Instructions

- Attempt all questions
- Write your name and student number on the question paper
- Write using black pen
- NESA approved calculators may be used
- The NESA reference sheet has been provided
- For questions in Section II, show relevant mathematical reasoning and/or calculations

Total marks: 65

Section I – 10 marks (pages 2 – 4)

- Attempt Questions 1-10
- Allow about 15 minutes for this section

Section II – 55 marks (pages 5 – 18)

- Attempt Questions 11-26
- Allow about 1 hour and 45 minutes for this section

Section I

10 marks

Attempt Questions 1–10

Allow about 15 minutes for this section

Use the multiple-choice answer sheet for Questions 1–10.

---

1. What is the value of $f(2a+1)$ if $f(x) = 3x - 2$

A. $6a - 2$

B. $6a - 1$

C. $6a + 1$

D. $6a + 2$

$f(2a+1) = 3(2a+1) - 2$
$= 6a + 3 - 2$
$= 6a + 1$

2. The line $5x - y - 4 = 0$ passes through the point $(k, 26)$. What is the value of k?

A. 3

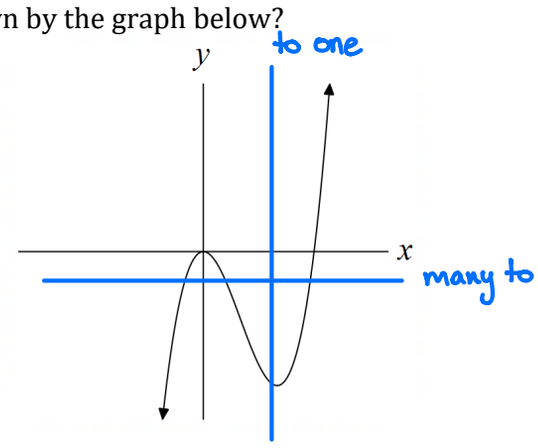
B. 4

C. 5

D. 6

$5(k) - 26 - 4 = 0$
$5k = 30$
$k = 6$

3. What type of relation is shown by the graph below?



A. One - to - One

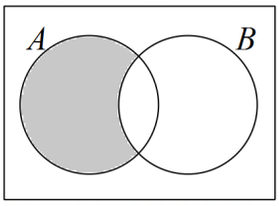
B. One - to - Many

C. Many - to - One

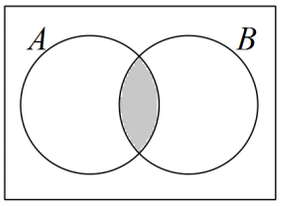
D. Many - to - Many

4. Which of the Venn diagrams shows $A \cap B'$ shaded?

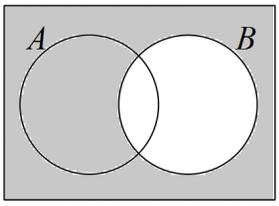
A.



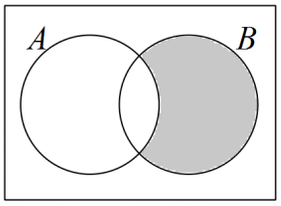
B.



C.



D.



5. The probability distribution for the random variable X is shown below.

x	2	3	4	5	6	7	8
$P(X = x)$	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{3}{16}$	$\frac{1}{8}$	$\frac{1}{16}$

What is $P(3 < X \leq 7)$?

$P(3 < x \leq 7) = \frac{3}{16} + \frac{1}{4} + \frac{3}{16} + \frac{1}{8}$

$= \frac{3}{4}$

A. $\frac{1}{2}$

B. $\frac{5}{8}$

C. $\frac{3}{4}$

D. $\frac{7}{8}$

6. Solve $|x - 3| - 8 = 0$

$(x-3) - 8 = 0$ or $-(x-3) - 8 = 0$

$x - 11 = 0$ or $-x - 5 = 0$

$x = 11$ or $x = -5$

A. $x = 11$

B. $x = 5$ *or* $x = -11$

C. $x = -5$ *or* $x = 11$

D. $x = 5$ *or* $x = 11$

7. Which of the following is true for the quadratic equation $3x^2 + x + 4 = 0$?

A. The roots are rational

B. There are no real roots

C. The roots are equal

D. The roots are irrational

$\Delta = (1)^2 - 4(3)(4)$
$= 1 - 48$
$= -47.$

Since $\Delta < 0$, no real roots

8. A sector has an angle of $\frac{\pi}{3}$ subtended at the centre of a circle. The radius is 6 cm.

The exact area of the sector is?

A. $\pi\ cm^2$

B. $3\pi\ cm^2$

C. $6\pi\ cm^2$

D. $12\pi\ cm^2$

$A = \frac{1}{2}r^2\theta$
$= \frac{1}{2} \times 6^2 \times \frac{\pi}{3}$
$= 18 \times \frac{\pi}{3}$
$= 6\pi\ cm^2$

9. A function is defined as $g(x) = 12x^3 - 8x + 14$

Evaluate $g'(-2)$.

A. -152

B. -66

C. 136

D. 150

$g'(x) = 36x^2 - 8$
$g'(-2) = 36(-2)^2 - 8$
$= 136$

10. The variance of a discrete random variable X is $Var(X) = 5.01$

Calculate $Var(5X - 2)$

A. 25.05

B. 26.05

C. 125.25

D. 126.25

Change in scale by 5^2

$Var(5x-2) = 5^2 Var(X)$
$= 5^2(5.01)$
$= 125.25$

End of Section I

Section II

55 marks

Attempt Questions 11 – 26

Allow about 1 hour and 45 minutes for this section

- Answer the questions in the spaces provided. These spaces provide guidance for the expected length of response.
- Your responses should include relevant mathematical reasoning and/or calculations.
- Extra writing space is provided at the back of this booklet. If you use this space, clearly indicate which question you are answering.

Question 11

(a) Express $(2\sqrt{3}+1)(2-\sqrt{3})$ in the form of $a+b\sqrt{3}$ where a and b are integers. **2**

$(2\sqrt{3}+1)(2-\sqrt{3}) = 4\sqrt{3} - 2(3) + 2 - \sqrt{3}$

$= 3\sqrt{3} - 4$

$\therefore -4 + 3\sqrt{3}$

(b) Show algebraically that $f(x) = \dfrac{2x}{x^2+3}$ is an odd function. **2**

Odd functions $f(-x) = -f(x)$

$f(-x) = \dfrac{2(-x)}{(-x)^2+3}$

$= \dfrac{-2x}{x^2+3}$

$= -\left(\dfrac{2x}{x^2+3}\right)$

$= -f(x)$

$\therefore f(x)$ is an odd function.

(c) Rewrite the following expression without any negative or fractional indices. **2**

$$\left(\frac{12x^{-3}y^2}{xyz^{\frac{1}{2}}}\right)^2$$

$$\left(\frac{12x^{-3}y^2}{xy\sqrt{z}}\right)^2 = \frac{144x^{-6}y^4}{x^2y^2z}$$

$$= \frac{144y^2}{x^8z}$$

Question 12

If $f(x) = x^2$ and $g(x) = 2x + 1$

(a) Find the composite function $f(g(x))$ **1**

$f(g(x)) = (2x+1)^2$

$= 4x^2 + 4x + 1$

(b) What is the domain and range of the composite function $f(g(x))$? **2**

domain: $x \in (-\infty, \infty)$

domain: all real x

range: $y \in [0, \infty)$

range: $y \geq 0$

Don't need to show this for full marks, but handy to help find the range.

axis of symmetry $= \frac{-b}{2a}$

$= \frac{-4}{2(4)}$

$= -0.5$

vertex: $f(g(-0.5)) = (2(-0.5)+1)^2$

$= 0$

$\therefore$ vertex $= (-0.5, 0)$

Question 13

Differentiate $f(x) = 2x^2 - x + 3$ by first principals. **3**

$$f(x+h) = 2(x+h)^2 - (x+h) + 3$$
$$= 2x^2 + 4xh + 2h^2 - x - h + 3$$

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$$= \lim_{h \to 0} \frac{(\cancel{2x^2} + 4xh + 2h^2 \cancel{-x} - h \cancel{+3}) - (\cancel{2x^2} \cancel{-x} \cancel{+3})}{h}$$

$$= \lim_{h \to 0} \frac{2h^2 + 4xh - h}{h}$$

$$= \lim_{h \to 0} \frac{\cancel{h}(2h + 4x - 1)}{\cancel{h}}$$

$$= \lim_{h \to 0} 2h + 4x - 1$$

$$= 2(0) + 4x - 1$$

$$f'(x) = 4x - 1$$

Question 14

Differentiate, with respect to x:

(a) $4x^{-3}$ **1**

$\frac{d}{dx}(4x^{-3}) = -12x^{-4}$

(b) $y = (5 + 2x^2)^{\frac{1}{2}}$ **2**

$u = 5 + 2x^2 \qquad y = u^{\frac{1}{2}}$

$u' = 4x \qquad y' = \frac{1}{2}u^{-\frac{1}{2}}$

$\frac{dy}{dx} = 4x \times \frac{1}{2}(5 + 2x^2)^{-\frac{1}{2}}$

$= \frac{2x}{\sqrt{5 + 2x^2}}$

Question 15

A circle is given by the equation $x^2 + y^2 + 6x - 12y = 19$ **3**

What is the centre and radius of this circle?

$x^2 + 6x + \underline{\quad} + y^2 - 12y + \underline{\quad} = 19$

$+9 \qquad +36 \qquad +9 \quad +36$

$x^2 + 6x + 9 + y^2 - 12y + 36 = 64$

$(x+3)^2 + (y-6)^2 = 8^2$

$\therefore$ Centre: $(-3, 6)$

radius: 8 units.

Question 16

(a) If $f(x) = \frac{x^2-4}{2x+5}$ show that $f'(x) = \frac{2(x+4)(x+1)}{(2x+5)^2}$ **3**

$u = x^2 - 4 \qquad v = 2x + 5$

$u' = 2x \qquad v' = 2$

$$f'(x) = \frac{u'v - v'u}{v^2}$$

$$= \frac{2x(2x+5) - 2(x^2-4)}{(2x+5)^2}$$

$$= \frac{4x^2 + 10x - 2x^2 + 8}{(2x+5)^2}$$

$$= \frac{2x^2 + 10x + 8}{(2x+5)^2}$$

$$= \frac{2(x^2 + 5x + 4)}{(2x+5)^2}$$

$$= \frac{2(x+1)(x+4)}{(2x+5)^2}$$

$= f'(x)$ as required.

(b) Hence or otherwise find the equation of the tangent to $f(x) = \frac{x^2-4}{2x+5}$ at the point $\left(1, \frac{-3}{7}\right)$. **3**

Give your answer in general form.

Gradient of tangent: $f'(1) = \frac{2(1+1)(1+4)}{(2(1)+5)^2}$

$$= \frac{2(2)(5)}{(7)^2}$$

$$= \frac{20}{49}$$

$$y - \left(\frac{-3}{7}\right) = \frac{20}{49}(x - 1)$$

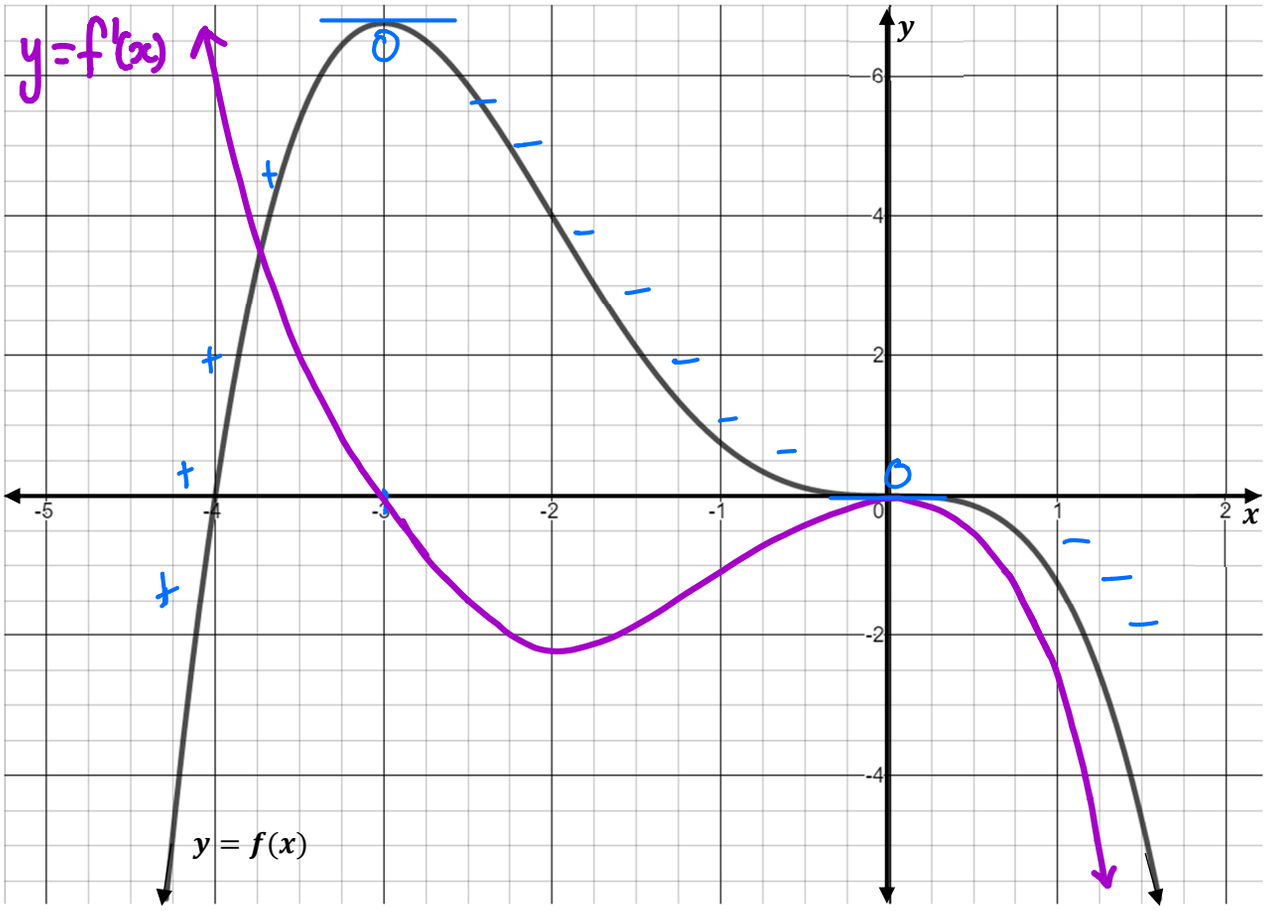
$$y = \frac{20}{49}x - \frac{20}{49} - \frac{3^{\times 7}}{7_{\times 7}}$$

$$0 = \frac{20}{49}x - y - \frac{41}{49}$$

$\therefore$ equation of tangent is $20x - 49y - 41 = 0$

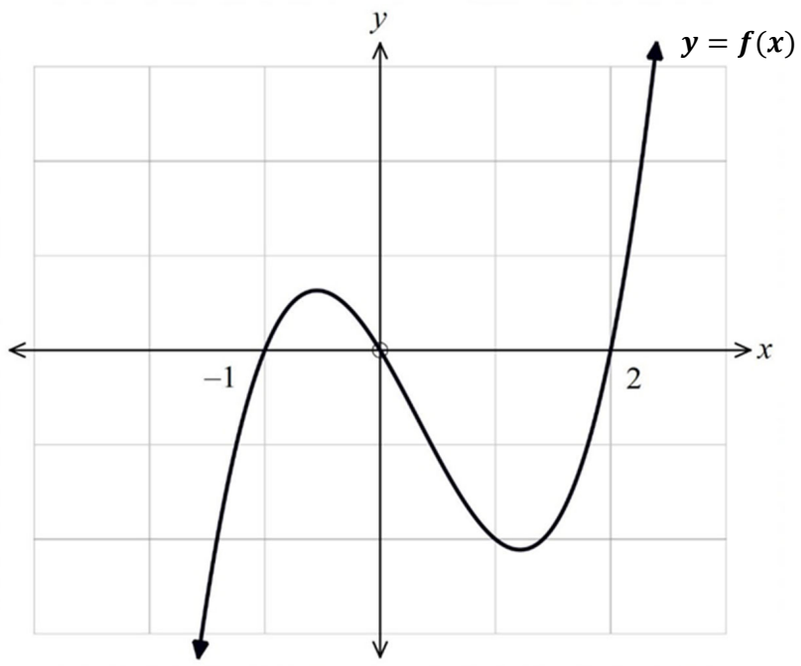
(c) The graph below shows the graph of $y = f(x)$. **2**

On the same set of axes sketch the gradient function.

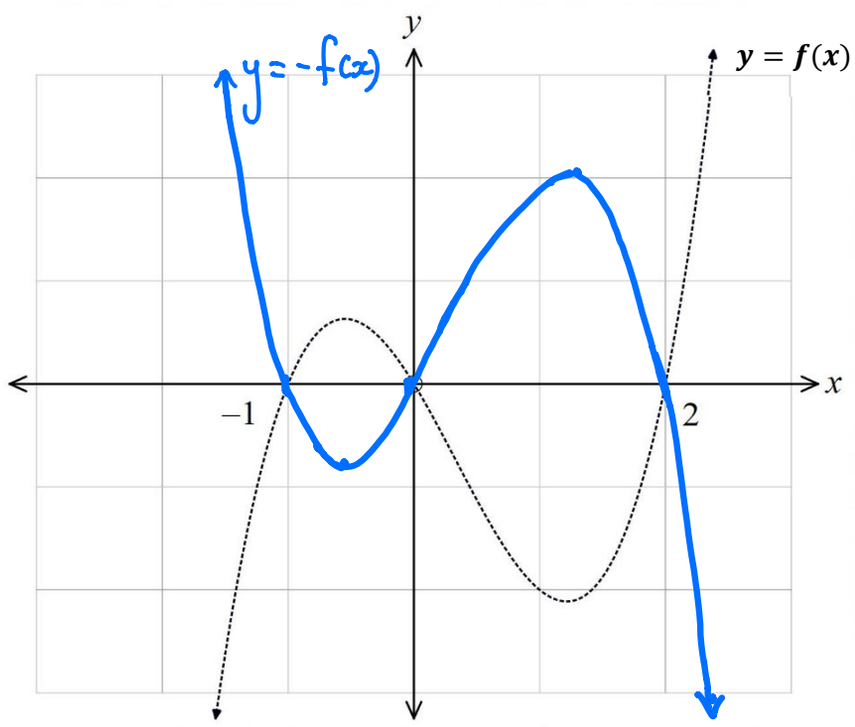


Question 17

The sketch of $y = f(x)$ is shown below.

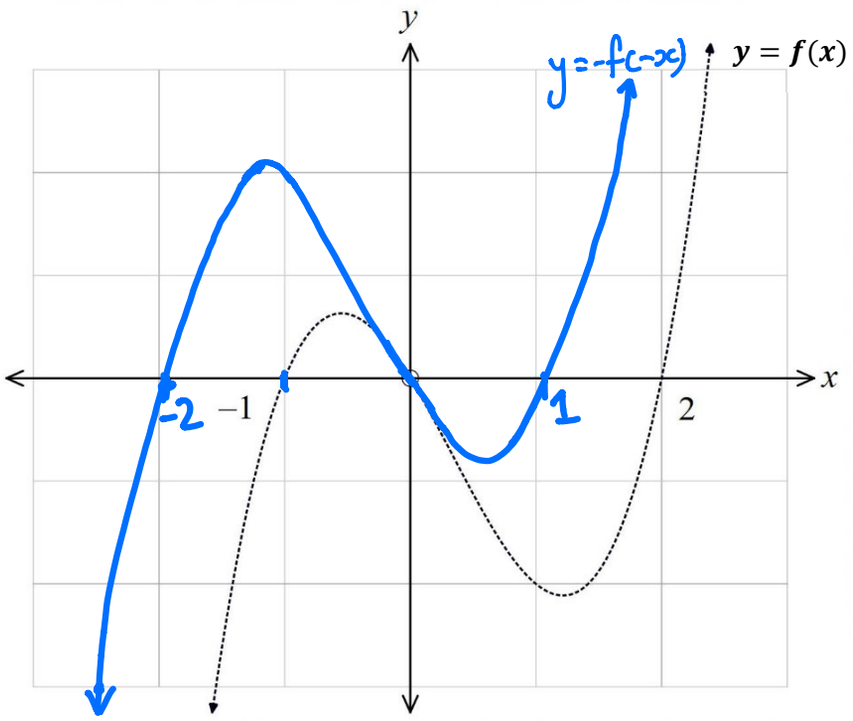


(a) Use the graph of $y = f(x)$ to draw a neat sketch of $y = -f(x)$ on the diagram below. **1**



(b) Use the graph of $y = f(x)$ to draw a neat sketch of $y = -f(-x)$ on the diagram below. **1**

Question amended to reflect correct use of notation



Question 18

(a) Convert $\frac{11\pi}{12}$ to degrees. **1**

$\frac{11\pi}{12} \times \frac{180}{\pi} = 165°$

(b) Find the exact value of tan 330° **2**

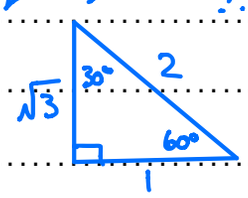
S | A
T | C

$330° = 4^{th}$ quad,

Related Angle:
$360 - \theta = 330$
$\therefore \theta = 30°$

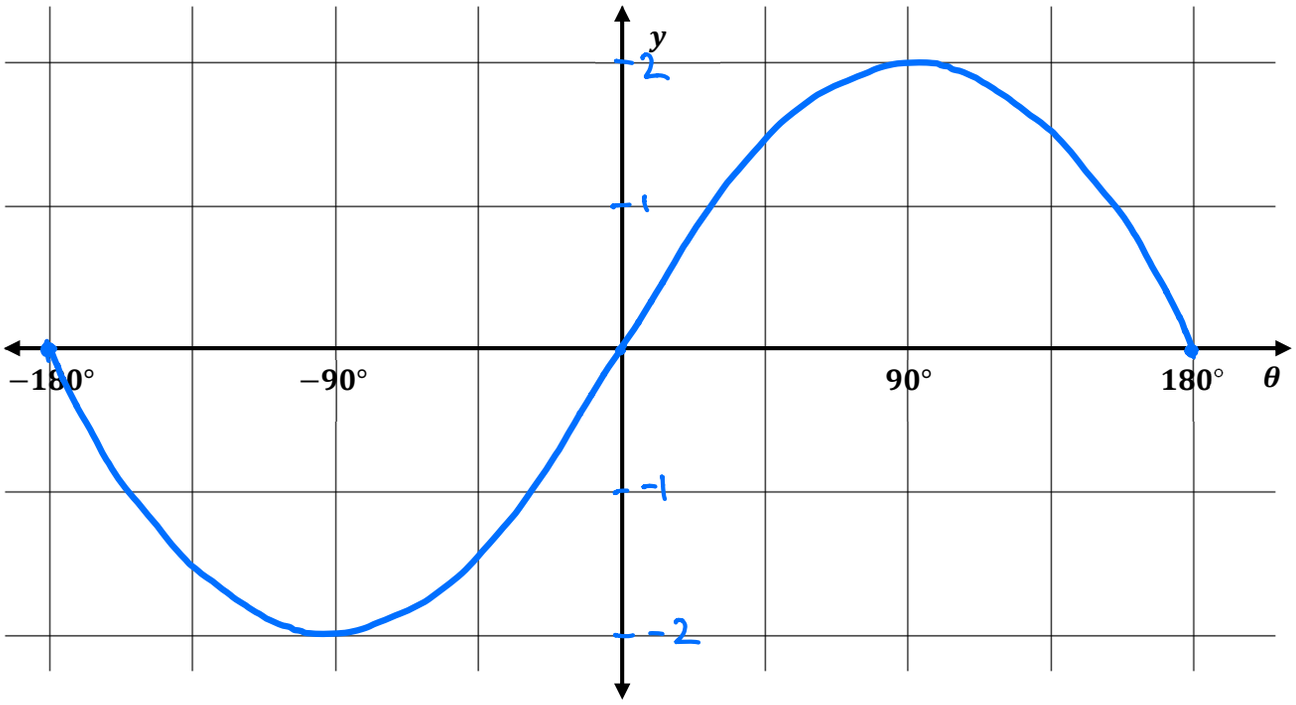
$\tan 330° = -\tan 30°$

$= -\frac{1}{\sqrt{3}}$



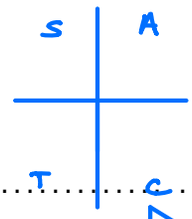
Question 19

Sketch the graph of $y = 2\sin\theta$ over the domain $\theta \in [-180°, 180°]$ **2**



Question 20

Determine the value(s) of θ for $2\cos\theta + 1 = 0$ over the domain $\theta \in [0, 4\pi]$ **3**



$2\cos\theta + 1 = 0$

$\cos\theta = -\frac{1}{2}$

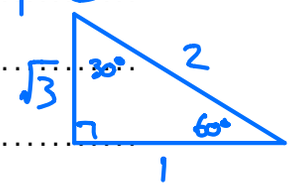
θ is in Q2, $\pi - \theta$

Q3, $\pi + \theta$

Related Angle:

$\cos\theta = \frac{1}{2}$, when $\theta = 60°$

$= \frac{\pi}{3}$



$2\pi < \theta < 4\pi$

$\frac{2\pi}{3} + \frac{6\pi}{3} = \frac{8\pi}{3}$

$\frac{4\pi}{3} + \frac{6\pi}{3} = \frac{10\pi}{3}$

$\boxed{\therefore\ \theta = \frac{2\pi}{3},\ \frac{4\pi}{3},\ \frac{8\pi}{3} \text{ and } \frac{10\pi}{3}}$

Question 21

The probability distribution of a random variable X is shown below **2**

x	−2	−1	0	1	2
P(X= x)	0.1	a	0.2	0.2	a

Calculate the value of a.

$0.1 + a + 0.2 + 0.2 + a = 1$

$0.5 + 2a = 1$

$2a = 0.5$

$a = 0.25$

Question 22

Jasmine is planting flowers in her garden. The probability that an individual flower survives is 0.35. Jasmine plants 5 flowers. **2**

What is the probability that at least one flower survives? Answer correct to two decimal places.

P(at least 1 survives) = 1 − P(No survive)

$= 1 - 0.65^5$

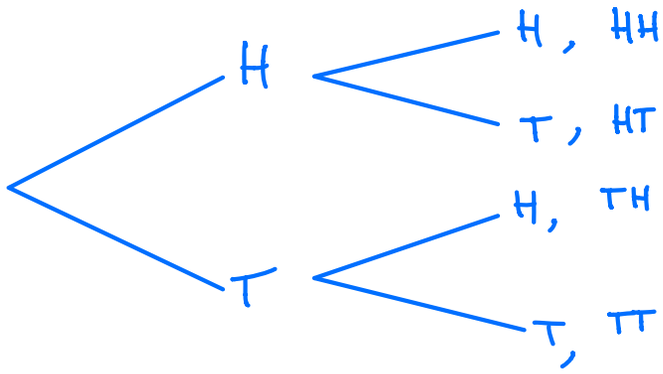
$= 0.883...$

$= 0.88$

Question 23

In a game of chance, Mr Mathface tosses 2 coins. He wins \$10 for 2 heads, \$5 for 2 tails and nothing for a head and a tail.

(a) Use a tree diagram to complete the probability distribution table below for the game of chance. **2**



x	\$0	\$5	\$10
$P(X = x)$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$

(b) Determine the expected value of this game **1**

$E(x) = (\frac{1}{2} \times 0) + (\frac{1}{4} \times 5) + (\frac{1}{4} \times 10)$

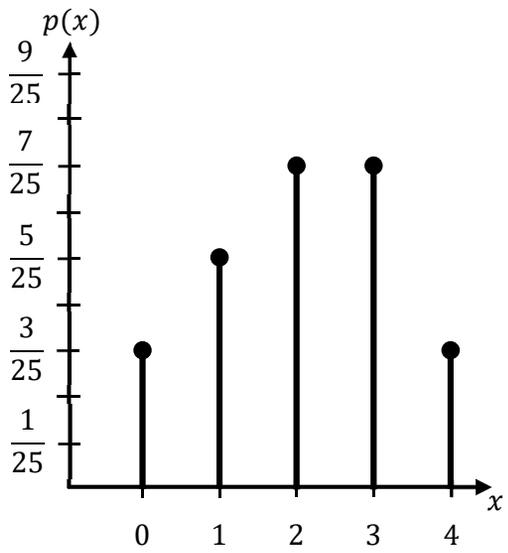
$= \$3.75$

(c) If the game costs \$4 to play, would Mr Mathface expect to win or lose money in the long term? Justify your answer with suitable calculations. **2**

Since $E(x)$, $3.75 < 4$, Mr Mathface will expect to lose money in the long term.

Question 24

The probability distribution of a discrete random variable X is shown. **2**



Given that $E(X) = 2.08$ calculate the $Var(X)$

$Var(X) = \frac{3}{25}(0-2.08)^2 + \frac{5}{25}(1-2.08)^2 + \frac{7}{25}(2-2.08)^2 + \frac{7}{25}(3-2.08)^2 + \frac{3}{25}(4-2.08)^2$

$= 1.4336$

OR

$Var(X) = E(X^2) - E(X)^2$

$= \left[\left(0^2 \times \frac{3}{25}\right) + \left(1^2 \times \frac{5}{25}\right) + \left(2^2 \times \frac{7}{25}\right) + \left(3^2 \times \frac{7}{25}\right) + \left(4^2 \times \frac{3}{25}\right)\right] - 2.08^2$

$= 1.4336$

Question 25

Four identical balls numbered 1, 2, 3 and 4 are placed into a box.

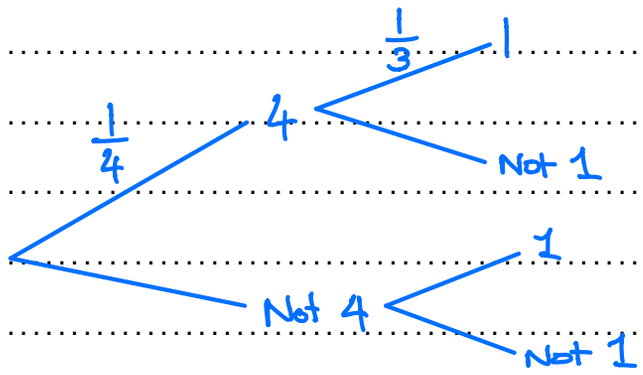
A ball is randomly drawn from the box and not returned to the box.

A second ball is then randomly drawn from the box.

(a) What is the probability that the first ball drawn is numbered 4 and the second ball drawn is numbered 1? **1**

$P(4 \text{ then } 1) = \frac{1}{4} \times \frac{1}{3}$

$= \frac{1}{12}$



(b) What is the probability that the sum of the two numbers is 5? **1**

$P(\text{Sum of } 5) = \frac{4}{12}$

$= \frac{1}{3}$

1st \ 2nd	1	2	3	4
1		3	4	5
2	3		5	6
3	4	5		7
4	5	6	7	

(c) Given that the sum on the two balls is 5, what is the probability that the second ball drawn is numbered 1? **1**

$P(2^{nd} \text{ ball is } 1 \mid \text{sum } 5) = \frac{P(A \cap B)}{P(B)}$

$= \frac{\frac{1}{12}}{\frac{1}{3}}$

$= \frac{1}{4}$

Question 26

The displacement of a particle moving in a straight line is given by **5**

$$x = 9t^2 - t^4$$

where x is the displacement from the origin in metres and t is the time in seconds, for $t > 0$.

Sketch the displacement time graph and then determine the total distance travelled in the first 3 seconds.

Leading Coefficent $= -1$, polynomial degree 4.

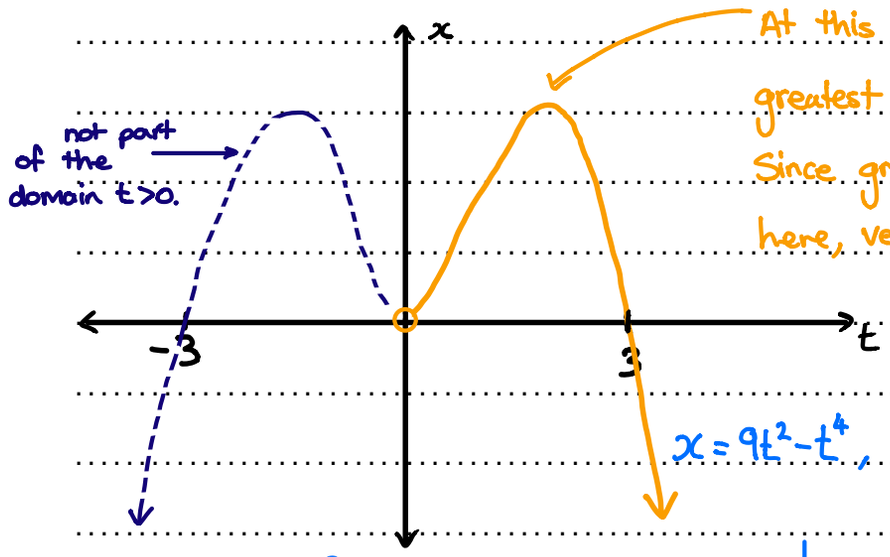
$x = t^2(9 - t^2)$

$= t^2(3+t)(3-t)$

double = bounce on x-axis

$\therefore$ x intercepts are $\overbrace{t=0,\ t=0}$, $t=-3$, $t=3$, , domain: $t>0$

Vertical axis intercept $= 0$.



At this point the particle is its greatest distance from origin. Since gradient of tangent $= 0$ here, velocity $= 0$.

$x = 9t^2 - t^4$, $t>0$

$\frac{dx}{dt} = 18t - 4t^3$

$\frac{dx}{dt} = 0$, $0 = 2t(9 - 2t^2)$

$t = 0$ or $9 - 2t^2 = 0$

$t = \pm\sqrt{\frac{9}{2}}$

$= \pm \frac{3}{\sqrt{2}}$

Since $t>0$, $t = \frac{3}{\sqrt{2}}$

Distance $= 2\left[9\left(\frac{3}{\sqrt{2}}\right)^2 - \left(\frac{3}{\sqrt{2}}\right)^4\right]$

$= 2\left(\frac{81}{2} - \frac{81}{4}\right)$

$= \frac{81}{2}$ m

$= 40.5$ m

End of Paper

Section II Extra writing space

If you use this space, clearly indicate which question you are answering.

Section II Extra writing space

If you use this space, clearly indicate which question you are answering.