

SECTION A

1 a)  $(x - \sqrt{-3})(3^x - 6)(2^x - 8) = 0$ .

(1)  $x \in \mathbb{Z}$        $2^x = 8$   
 $\xrightarrow{x=3}$       (2)

(2)  $x \in \mathbb{Q}$        $3^x = 6$   
 $x = \log_3 6$   
 $= 1,63$       (2)

(3)  $x \in \mathbb{R}$        $x = \sqrt{-3}$       (1)

2) i)  $2x^2 - 7x - h = 0$ .

$$x = \frac{7 \pm \sqrt{49 - 4(2)(-h)}}{4}$$

$$= \frac{7 \pm \sqrt{49 + 8h}}{4}$$

2) when  $49 + 8h = 0$

$$8h = -49$$

$$h = -\frac{49}{8}$$

$$h = 6,125$$

$$\approx 6,13$$
      (2)

9

2       $4p$ ;  $3p+15$ ;  $5p+20$ .

(a)  $\frac{3p+15}{4p} = \frac{5p+20}{3p+15}$

$$(3p+15)^2 = 4p(5p+20)$$

$$9p^2 + 90p + 225 = 20p^2 + 80p$$

$$0 = 11p^2 - 10p - 225 \quad (3)$$

(b)  $x_1 = 5$        $x_2 = -\frac{45}{11}$   
 $\therefore p = 5$       (1)

(c)  $\frac{3p+15}{4p} = \frac{30}{20} = \frac{3}{2} = r$       (1)

(d)  $S_{10} = 20 \left( \left( \frac{3}{2} \right)^{10} - 1 \right)$   
 $= 40 \left( \left( \frac{3}{2} \right)^{10} - 1 \right)$   
 $= 2266,6$   
 $\approx 2267$       (3)

8

Q3  
 (1)  $S_2 = \frac{2}{3}$       (1)

(2)  $S_3 = \frac{3}{4}$       (1)

(3)  $S_4 = \frac{4}{5}$       (1)

(4)  $S_n = \frac{n}{n+1}$       (1)

(5)  $\frac{2015}{2016}$       (1)

$r = 2$ .

(b)  $T_{18} = 10(2)^{17}$   
 $= 1310720$       (3)

$$g) \sum_{r=0}^{\infty} \frac{a}{4^r} = 16$$

$$r=0 \quad T_1 = a$$

$$r=1 \quad T_2 = \frac{a}{4}$$

$$r=2 \quad T_3 = \frac{a}{16}$$

$$\therefore "a" = a \quad r = \frac{1}{4}$$

$$16 = \frac{a}{1 - \frac{1}{4}}$$

$$16 \left( \frac{3}{4} \right) = a$$

$$\underline{12 = a} \rightarrow$$

(4)

12

$$\therefore -7 < x < 3$$

$$(d) \quad 2,8 < x < 3 \quad (1)$$

17

$$\underline{Q5} \quad f(x) = x^2 + \frac{16}{x}$$

$$(a) \quad f'(x) = 2x - \frac{16}{x^2} \quad (2)$$

$$(b) \quad 2x - \frac{16}{x^2} = 0$$

$$2x^3 - 16 = 0$$

$$2x^3 = 16$$

$$x^3 = 8$$

$$x = 2$$

$$\therefore y = 4 + 8 = 12$$

$$A(2; 12) \quad (4)$$

$$(c) \quad \text{Range of } f(x)$$

$$y \geq 12; y \in \mathbb{R}$$

$$\text{Domain of } f^{-1}(x)$$

$$x \geq 12; x \in \mathbb{R} \quad (2)$$

$$(d) (i) \quad A' (4; 12)$$

$$(2) \quad A'' (2; 6) \quad (2)$$

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$$\underline{Q6} \quad (a) \quad x\sqrt{27} + 21 = \frac{6x}{\sqrt{3}} \quad x \text{ by } \sqrt{3}$$

$$x\sqrt{81} + 21\sqrt{3} = 6x$$

$$9x - 6x = -21\sqrt{3}$$

$$3x = -21\sqrt{3}$$

$$x = -\sqrt{3}$$

(4)

Q4

width  $x$

length  $x+4$

$$(a) \quad P > 19,2$$

$$2(x+x+4) > 19,2$$

$$2x+4 > 9,6$$

$$2x > 5,6$$

$$x > 2,8$$

(2)

$$(b) \quad A < 21$$

$$x(x+4) < 21$$

$$(c) \quad x^2 + 4x - 21 < 0$$

$$(x+7)(x-3) < 0$$

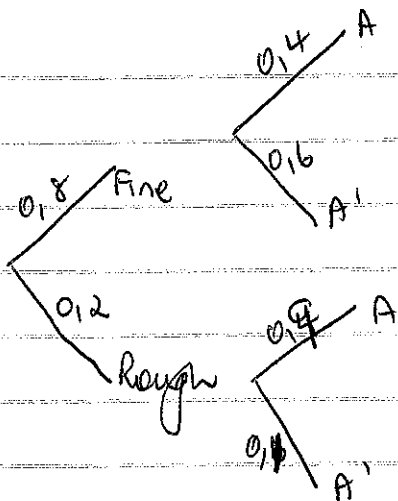
uv.  $-7$  and  $3$

$$\begin{array}{ccccccc} & + & 0 & - & 0 & + & \\ & & | & & | & & \\ & & -7 & & 3 & & \end{array}$$

(4)

A vert....

Q 6 (b)



$$P(A \text{ win}) = 0.8 \times 0.4 + 0.2 \times 0.9$$

$$= 0.32 + 0.18$$

$$= 0.5$$

(5)

19

QUESTION B

17  $f(x) = 2x^3 - 5x^2 + ax + 18$

a)  $f(3) = 0$

$$2(3)^3 - 5(3)^2 + a(3) + 18 = 0$$

$$54 - 45 + 3a + 18 = 0$$

$$3a = -27$$

$$a = -9$$

(2)

b)  $f(x) = (x-3)(2x^2 + x - 6)$

$$= (x-3)(2x-3)(x+2)$$

(4)

c)  $3^y = "x"$

$$\therefore 3^y = 3 \quad / \quad 3^y = \frac{3}{2} \quad / \quad 3^y = -2$$

$$y = 1 \quad \quad \quad y = 0.37 \quad \quad \quad X$$

(3)

19

Q8

(a)  $a?$

$$2000 \quad T_{15} = a + \frac{14}{1}d$$

$$238 = a + \frac{14}{1}d$$

$$238 - 14d = a$$

$$2010 \quad T_{25} = a + 24d = 108$$

$$a = 108 - 24d$$

$$238 - 14d = 108 - 24d$$

$$10d = -130$$

$$d = -13$$

$$\therefore a = 108 - 24(-13)$$

$$1986 \quad a = 420 \text{ houses. (5)}$$

(b)  $S_{25} = \frac{25}{2} [2(420) + 24(-13)]$

$$= 6600 \text{ houses. (2)}$$

17

Q9

(a) (1) Rugby.  $\frac{100}{1}$  (1)

(2)  $P(R \cap C) = \frac{140}{200} = \frac{7}{10}$  (1)

(3)  $P(\text{not}(R \text{ or } S \text{ or } C)) = \frac{20}{200} = \frac{1}{10}$  (1)

(4)  $P(R \cap C) = \frac{25}{200} = \frac{1}{8}$

$$P(R) \times P(C) = \frac{1}{2} \times \frac{65}{200} = \frac{65}{400} = \frac{13}{80}$$

$\therefore$  not independent  $\frac{1}{8} \neq \frac{13}{80}$  (4)

$$(b) A = \frac{(8500-75)}{2500} (1+0,01)^{\frac{1}{2}} (1,02)^{\frac{2}{12}} (1,03)^{\frac{3}{12}} (1,04)^{\frac{4}{12}}$$

$$= R 8634,76$$

(4)

11

Q11

(a) KARDASHIANS

11 letters  
A x 3  
S x 2

$$(a) \frac{11!}{3!2!} = 3326400 \quad (5)$$

$$(b) \frac{9!}{2!} = \frac{3}{55} \quad \begin{matrix} 9 \text{ letters} \\ "S" \times 2 \end{matrix} \quad (3)$$

8

Q10

New eq. R 200 450

(a) Old eq.  
New worth

$$A = 167000(1-0,122)^{12}$$

$$= R 35046,98$$

Balance needed as loan

$$200450 - 35046,98$$

$$= 165403,02$$

∴ loan will be @ 10,01% p.a.  
monthly

PV

$$165403,02 \left(1 + \frac{0,1001}{12}\right)^b = x \left[ \frac{1 - \left(1 + \frac{0,1001}{12}\right)^{-234}}{\frac{0,1001}{12}} \right]$$

$$173856,01$$

$$x = R 1692,54 \text{ per month} \quad (5)$$

$$(b) 1692,54 \times 234 = 396053,83$$

$$- 165403,02$$

$$\text{INTEREST } 230650,81 \quad (3)$$

$$(c) \frac{\text{interest}}{\text{loan}} = 1,39 \quad (3)$$

\* Also accept S.I. option

$$A = (8500-75) \left(1 + 0,01 \times \frac{1}{12}\right) \left(1 + 0,02 \times \frac{1}{6}\right) \left(1 + 0,03 \times \frac{1}{4}\right) \left(1 + 0,04 \times \frac{1}{3}\right)$$

$$= R 8637,23$$

SECTION C

12  $f(x) = x^2 - \frac{1}{3}x^3$

(a)  $0 = x^2(x - \frac{1}{3}x)$

$x = 0$  or  $x = 3$

$\therefore A(3; 0)$  (1)

~~or sub  $x=3$  and get  $\rightarrow$   
 $f(3) = 0$ . No!~~

(b) at A

$f'(x) = 2x - x^2$

$f'(3) = 6 - 9$   
 $= -3$

$y = -3x + C$

3:0)  $0 = -9 + C$

$9 = C$

$y = -3x + 9$

(5)

(c) B?  $x?$

$-3x + 9 = x^2 - \frac{1}{3}x^3$

$\frac{1}{3}x^3 - x^2 - 3x + 9 = 0$

$x_1 = -3$   $x_2 = 3$

$\therefore Bx = -3$  (4)

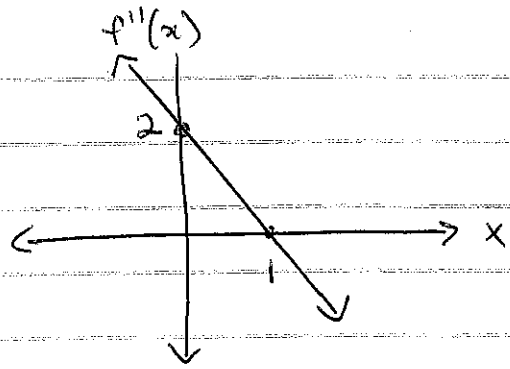
(d)  $f''(x) = 2 - 2x = 0$  at A in  $f(x)$

$2 = 2x$

$1 = x$  (2)

(e)  $f''(0) = 2$  (2)

(4)



(3)

(9)

$f(x)$  has 3 Roots.

Between  $x=0$  and  $x$  of TP.

$x$  TP.  $2x - x^2 = 0$

$x(2 - x) = 0$

$x = 2$

$\therefore y = 4 - \frac{4}{3}$   
 $= \frac{8}{3}$

$\therefore 0 > k > -\frac{4}{3}$  (5)

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Q13

(e)  $c - a$  must be positive  
 pos - (neg)

12

Q14

$$f(x) = 2^x - 8$$

$$g(x) = ax^2 + bx + c$$

(a) A  $x = ?$   $y = 0$

$$0 = 2^x - 8$$

$$x = 3$$

$$A(3; 0)$$

B  $x = 0$   $y = ?$

$$2^0 - 8 = -8$$

$$B(0; -7)$$

(4)

(b)  $y = -8$

(1)

(c)  $h(x) = f(2x) + 8$

$$= 2^{2x} - 8 + 8$$

$$= 2^{2x}$$

(2)

(d)  $f^{-1}(x)$

$$x = 2^y - 8$$

$$x + 8 = 2^y$$

$$\log_2(x+8) = y$$

(2) Q15

(e)  $p(x) = -(2^x - 8)$

$$= -2^x + 8$$

(1)

(f)  $f'(x) \cdot g(x) < 0$

everywhere except  $x = 3$

$$x \in \mathbb{R}; x \neq 3$$

(2)

$$(g) \sum_{n=0}^3 g(n) - \sum_{n=4}^5 g(n)$$

$$= -4,5 + 0 = -4,5$$

(4)

or find  $g(x)$

$$g(x) = ax^2 + bx - 4,5$$

T.P.  $g(x) = a(x-3)^2 + 0$

sub  $(0; -4,5)$

$$-4,5 = 9a$$

$$-\frac{1}{2} = a$$

$$g(x) = -\frac{1}{2}(x^2 - 6x + 9)$$

$$= -\frac{1}{2}x^2 + 3x - 4,5$$

$$\sum_{n=0}^3 g(n) - \sum_{n=4}^5 g(n)$$

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

$$= -4\frac{1}{2}$$

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(a)  $f(x) + f(x+3) = 2x + 5$

$$f(2) + f(5) = 9$$

$$f(5) + f(8) = 15$$

$$f(2) + 2f(5) + f(8) = 24$$

$$12 + 2f(5) = 24$$

$$2f(5) = 12$$

$$f(5) = 6$$

(4)

Cont----

Q15

b

$$\frac{\Delta \text{acres}}{\Delta \text{yr}} = 2,718t^2 - 19,86t + 50,18 \text{ million acres/yr.}$$

$$\text{acres} = \frac{2,718t^3}{3} - \frac{19,86t^2}{2} + 50,18t + 27,2 \text{ million acres}$$

In 2013  $t = 6$

$$\text{acres} = \frac{2,718(6)^3}{3} - \frac{19,86(6)^2}{2} + 50,18(6) + 27,2.$$

$$= 166,496 \text{ million acres in 2013.}$$

(5)

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The first part of the document discusses the importance of maintaining accurate records and the role of the auditor in ensuring the integrity of the financial statements. It highlights the need for transparency and the consequences of non-compliance with accounting standards.

The second part of the document provides a detailed analysis of the company's financial performance over the past year. It includes a breakdown of revenue, expenses, and profit, along with a comparison to the previous year's figures. The analysis shows a steady increase in revenue, which is attributed to the company's expansion into new markets and the successful launch of its new product line.

The third part of the document focuses on the company's risk management strategies. It identifies the key risks facing the company, such as market volatility and changes in consumer behavior, and outlines the measures being taken to mitigate these risks. The company has implemented a robust risk management framework that includes regular risk assessments and the use of hedging instruments to manage financial risks.

The fourth part of the document discusses the company's human resources and organizational structure. It highlights the company's commitment to employee development and the implementation of a performance-based compensation system. The organizational structure is designed to be flexible and responsive to the company's needs, with clear lines of responsibility and communication.

The fifth part of the document provides a summary of the company's overall performance and outlook for the future. It concludes that the company has achieved significant milestones and is well-positioned to continue its growth trajectory. The company's strong financial performance, effective risk management, and commitment to employee development are key factors contributing to its success.

