

SECTION A

surely form specific

1(a)  $(x - \sqrt{5})(2x - 8) = 0$

(1)  $x \in \mathbb{Z}$   $(2x - 8) = 0$   
 $2x = 8$   
 $x = 4$

(2)  $x \in \mathbb{Q}$   $x = \sqrt{5} = (2, 24)$

(b)  $2x^2 + 10x + 7 = 0$   
 formula/calculator

$x_1 = \frac{-5 + \sqrt{11}}{2}$   $x_2 = \frac{-5 - \sqrt{11}}{2}$   
 $= -0,84$   $= -4,16$

(c)  $x = \frac{-42 \pm \sqrt{42^2 - 1764}}{18}$

(1) Real

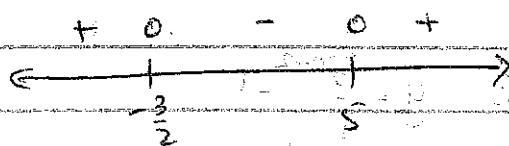
(2) Equal

(d)  $2x^2 > 7x + 15$

$2x^2 - 7x - 15 > 0$

$(2x + 3)(x - 5) > 0$

c.v.  $-\frac{3}{2}$  / 5



$\therefore x \in (-\infty, -\frac{3}{2})$  OR  $x \in (5, \infty)$

(a) p = 100

q = 30

r = 23

s = 47

t = 68

u = 77

(b) (1)  $\frac{16}{100}$

(2)  $\frac{30}{37}$

QUESTION 3

(a) (1)  $T_n = 2n - 1$

(2) Radius of  $18^{th} = 35$

Area  $18^{th} = \pi(35)^2$   
 $= 1225\pi$   
 $= 3848,45 \text{ units}^2$

(b) 5, 2, -7, -22

-3, -9, -15

-6, -6

$T_n = 5 - 3(n-1) - \frac{6}{2}(n-1)(n-2)$

$= 5 - 3n + 3 - 3(n^2 - 3n + 2)$

$= 8 - 3n - 3n^2 + 9n - 6$

$= -3n^2 + 6n + 2$

(c) (1)  $\frac{1}{4}, \frac{2}{9}, \frac{4}{10}, \frac{8}{13}$

next two  $\frac{16}{16}, \frac{32}{19}$

OR  $\frac{1}{16}, \frac{32}{19}$

(2)  $T_{25} = ?$   $T_n = \frac{2^{n-1}}{3n+1}$

$T_{25} = \frac{2^{24}}{75+1} = \frac{2^{24}}{76}$

NOT NEEDED  $\frac{16777216}{76}$

NOT NEEDED  $= 220752,84$

SECTION B

24 (a)  $\frac{3^{2x+2} - 3^{x-2}}{4 \cdot 3^{2x-3}}$

$= \frac{3^x(3^2 - 3^{-2})}{4 \cdot 3^x \cdot 3^{-3}}$

$= \frac{9 - \frac{1}{9}}{\frac{4}{27}}$

$= \frac{80}{9} \times \frac{27}{4}$

$= 60$

(b)  $\sqrt{81a^4} - \sqrt{64p^{10}} + \sqrt{9a^4} - \sqrt[3]{512p^6}$   
 $= 9a^2 - 8p^5 + 3a^2 - 8p^5$

$= 12a^2 - 16p^5$

(c)  $A = 540000(1+0,11)^8$   
 $= 8212575,80$

QUESTION 5

(a)  $1 + i_{eff} = \left(1 + \frac{0,115}{4}\right)^4$

$i_{eff} = 0,12055$

$i_{eff} = 12,01\%$

(b) (1) Kelly =  $15000(1+0,087)^8 + 30 \times 15000$   
 $= 25890$

(2) Dara =  $15000\left(1 + \frac{0,069}{12}\right)^{12 \times 8}$   
 $= 26009,69$

QUESTION 6

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

$1 = 3^{x-2}$

$x-2 = 0$

$x = 2$

A(2;0)

(b) B  $y = 3^{0-2} - 1$   
 $= \frac{1}{9} - 1$   
 $= -\frac{8}{9}$  B(0;  $-\frac{8}{9}$ )

$$(c) y = -1$$

$$(d) (1) g(x) = 3^{-x-2} - 1$$

$$(2) y = -1$$

(e) never

$$(f) x \cdot f(x) > 0$$

where  $x$  and  $y$  have same signs

$$\therefore x < 0 \text{ OR } x > 2$$

### Question 7

or sheet

$$(a) f(x) = \frac{1}{x}$$

(b) (1) Complete sketch  
asymptotes  
other half.

$$(2) g(x) = \frac{1}{x} + 2$$

$$(c) (1) p(x) = \frac{1}{x+1}$$

$$(2) x=0 \therefore y=1 \quad (0,1)$$

$$(d) 0 < x \leq 1$$

### Section C

$$(a) c = 94 - 75 = 19$$

$$(b) f = 41 - 18 - x = 23 - x$$

$$(c) e = 34 - 17 - x = 17 - x$$

$$(d) 23 - f = 17 - e$$

$$40 + e + f + x = 75$$

$$e + f + x = 35$$

$$17 - x + 23 - x + x = 35$$

$$40 - x = 35$$

$$5 = x$$

$$\therefore e = 17 - 5 = 12$$

$$f = 23 - 5 = 18$$

$$(e) \frac{5+10+8+9}{84} = \frac{32}{84} = \frac{8}{21}$$

$$\text{OR } 0,38$$

### Question 9

$$(a) B? \quad 3y = x - 5$$

$$0 = x - 5$$

$$5 = x$$

$$B(5,0)$$

$$(b) y = a(x+2)(x-5)$$

sub  $(-1,3)$

$$3 = a(1)(-6)$$

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

$$y = -\frac{1}{2}(x^2 - 3x - 10)$$

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

(c) TIP.  $x = -\frac{b}{2a} = -\left(\frac{3}{2}\right) \div 2\left(-\frac{1}{2}\right)$

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

$$\therefore y = \frac{49}{8} \quad \text{Sub.}$$

OR  $A \rightarrow B$  midpoint

$$x = \frac{5-2}{2} = \frac{3}{2}$$

$$\text{Sub for } y = \frac{49}{8}$$

$$\therefore \text{T.P.} = \left(\frac{3}{2}, \frac{49}{8}\right)$$

(d) D (-1, 3) DE // y-axis

$$\therefore E (-1; y)$$

$$3y = -1 - 5$$

$$3y = -6$$

$$y = -2$$

$$\therefore \text{DE} = 5 \text{ units}$$

(e)  $h(x)$  Reflect <sup>line</sup> about x-axis

$$3y = x - 5$$

Reflected  $3y = -(x - 5)$

$$h(x) \quad y = -\frac{1}{3}x + \frac{5}{3}$$

Question 10

$$564 = x \left(1 + \frac{0.12}{12}\right)^{12 \times 5} - 2000 \left(1 + \frac{0.12}{12}\right)^{60-18}$$

$$23564 + 2000(1.01)^{42} = x(1.01)^{60}$$

$$\frac{23564 + 2000(1.01)^{42}}{1.01^{60}} = x$$

$$x = R14\,642,829 \dots$$

$$= R14\,642,83 \dots$$

SECTION D

QUESTION 11

(a)  $2x^2 + px - 8 = (qx - 4)(x + k)$

$$k = 2$$

$$q = 2$$

$$p = 0$$

(b) (i) RTP  $\sqrt{\frac{3^{2x+1} - 3^{2x}}{3^{2x-1}} + 3} = 3$

LHS  $\sqrt{\frac{3^x(3-1)}{3^x \cdot 3^{-1}} + 3}$

$$= \sqrt{2 \cdot 3 + 3} = \sqrt{9} = 3 = \text{RHS}$$

(2)  $3 = \left(\frac{1}{3}\right)^{x-2}$

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

$$\therefore 1 = -x + 2$$

$$x = 1$$

## SECTION D cont. ....

QUESTION 11

(c) given  $y = ax^2 + bx - 3$

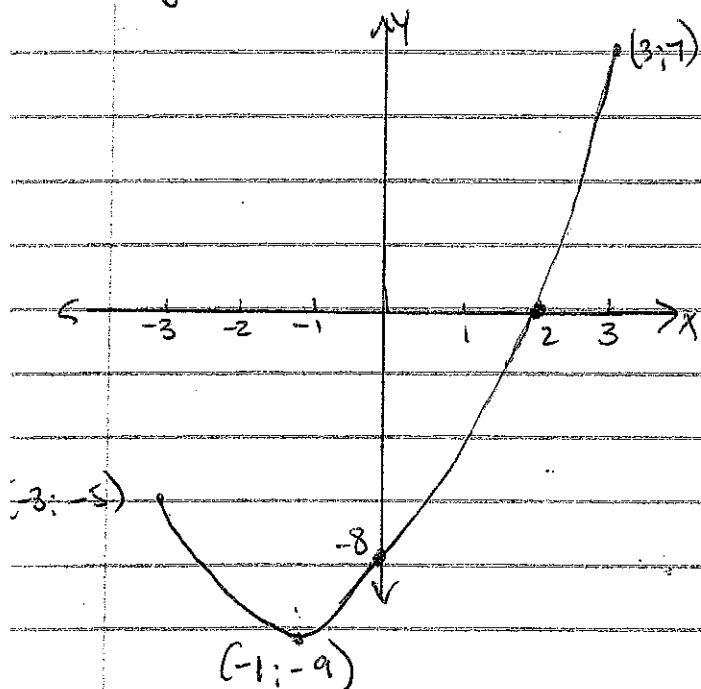
(1) Range  $y \in [-4; 12]$

(2)  $f(x) < 0$  and  $f(x) \downarrow$

when  $x \in (-3; -1)$

(3) sketch *don't solve.*

$y = ax^2 + bx - 8 \quad x \in [-3; 3]$



any 3 co-ords out of 5

QUESTION 12

(a)  $\frac{h}{x} = 12$        $\frac{h}{y} = 8$

$\frac{h}{12} = x$        $\frac{h}{8} = y$

$x + y = 5$

$\frac{h}{12} + \frac{h}{8} = 5$

$2h + 3h = 120$

$5h = 120$

$h = 24$

$\therefore x = 2$

$y = 3$

(b)  $-9; -7; -5; -3; -1; 1; 3; 5; 7; 9$   
x    x    x    x

$m^4 > 100$

$P(m^4 > 100) = \frac{6}{10}$

(c)

$4; 3; -1; -4; -3; 1; 4; 3 \dots$

Repeat of 6

$\frac{2008}{6} = 334 \frac{4}{6}$

 $\therefore 4^{\text{th}}$  in the pattern

$\therefore 2008^{\text{th}} = -4$