Gr. 11. Nov 2014 Maths Paper 1

A:

1 a) $x^2 - 3x + 2 = 6$

$x^2 - 3x - 4 = 0$

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

$x = 4$ or $x = -1$ (3)

b) $x - 7 = \sqrt{x-5}$

$x^2 - 14x + 49 = x - 5$

$x^2 - 15x + 54 = 0$

$(x-9)(x-6) = 0$

$x = 9$ or $x = 6$ (6)

c) $2^{x-2} \cdot 2^{\frac{x}{2}} = 2^5 \cdot 2^{\frac{1}{2}}$

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

$2x - 4 + x = 10 + 1$

$3x = 15$ (4)

$x = 5$

d) $4 \cdot 2^x \cdot 2^x + 3 \cdot 2^x = 1$

Let $2^x = k$:

$\therefore 4k^2 + 3k - 1 = 0$

$\therefore (4k-1)(k+1) = 0$

$k = \frac{1}{4}$ or $k = -1$

N/A

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

$x = -2$ (5)

2a) $21 + 2x + 11 + 4x = 110$

$2x = 36$

$x = 18$ (2)

b) $5 + 3 + 18 + 8 = 34$ (1)

c) $\frac{9}{190}$ (2)

d) $\frac{27}{}$

Memo

3 a) $A = P(1 + \frac{i}{t})^{nt}$

$= 50000(1 + \frac{0,08}{4})^{10}$

$= R63\,419,99$ (3)

b) $1 + i_{eff} = (1 + \frac{i_{nom}}{t})^t$

$i_{eff} = (1 + \frac{0,08}{4})^4 - 1$

$= 8,24\%$ (3)

4a) $OC = 3$ units (1)

at A; B: $x^2 + 2x - 3 = 0$

$(x+3)(x-1) = 0$

$x = -3; 1$

$\therefore OA = 3$ units; $OB = 1$ unit (4)

b) $y = -(x^2 + 2x) + 3$

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

$\therefore TP(-1; 4)$ (4)

* or $x = \frac{-b}{2a} = \frac{2}{-2} = -1$

$\therefore y = 4$

$\therefore TP(-1; 4)$

c) $m = \frac{3-0}{0+3} = 1$

$c = 3$ (2)

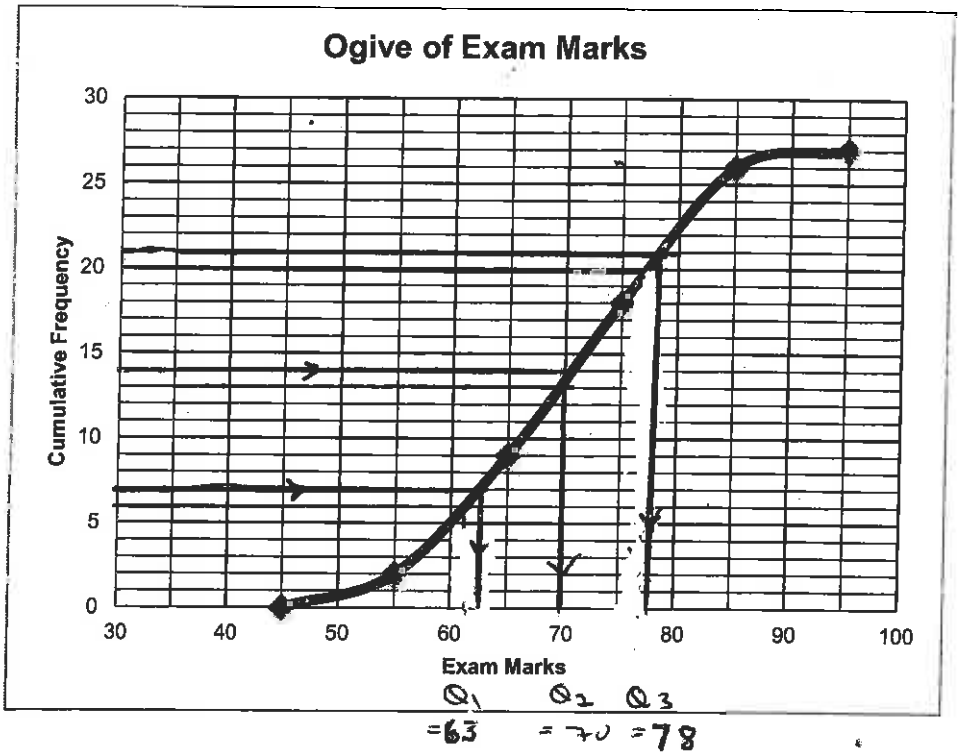
$y = x + 3$

d) $TR = (-x^2 - 2x + 3) - (x + 3)$

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

QUESTION 6

Consider the ogive for a set of examination marks and answer the questions that follow.



a) In which interval does the highest frequency of marks occur? (1)
b) Write down the 5 number summary for this set of data. (4)
c) Hence, draw a box-and-whisker plot for these data. (3)
[8]

SECTION B

QUESTION 7

Consider the *quadratic* pattern:

-9 ; -6 ; 1 ; x ; 27

a) Give the value of the second difference. (1)
b) Determine an expression for the second difference in terms of x. (1)
c) Hence, solve for x. (1)
d) Show that $T_n = 2n^2 - 3n - 8$. (5)
e) Which term in the sequence has a value of 397? (4)
[12]

5 a) i) $\bar{x} = 26$ ✓ (2) k/k : 2

ii) $sd = 6,6$ ✓ (2)

b) i) $sd = (19,35 \quad 32,35)$ ✓

∴ 6 athletes ✓ (2) c : 2

b) i) $SA = 8\%$ ✓ k/k : 2

ii) mean = 67% ✓ c : 1

iii) median = 63% ✓ (3)

6 a) [45 ; 55) 3

[55 ; 65) 9 − 3 = 6

[65 ; 75) 18 − 9 = 9

[75 ; 85) 26 − 18 = 8 c : 1

[85 ; 95) 27 − 26 = 1

∴ [65 ; 75) ✓ (1)

b) 45 (52) 70 78 95 c : 4

Q_0 Q_1 Q_2 Q_3 Q_4

(4)

c) 

(3)

Box & whisker plot of marks

8 i) 

7 a) 3 ; 7 ; $2x-1$ (1) k/k : 1

$d_2 = 4$ ✓

b) $(x-1) - 7 = 7 - 8$ ✓ (1) c : 1

c) $x - 8 = 4$ k/k : 1

$x = 12$ ✓ (1)

d) $a = \frac{4}{2} = 2$ ✓ c : 4

$T_1 = a + b + c$

$T_2 = 4a + 2b + c$

$d_1 = 3a + b$ ✓ (5)

$3 = 6 + b$

$-3 = b$ ✓ ∴ $-9 = 2 - 3 + c$

7 e) $2n^2 - 3n - 8 = 397$ ✓

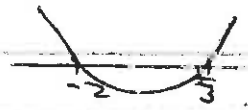
$2n^2 - 3n - 405 = 0$ ✓ k/k : 4

$n = 15$ ✓ or $n = -\frac{27}{2}$ N/A (calc) (4)

or $(2n + 27)(n - 15) = 0$ ✓ ok

8 i) $\sqrt{-7}$ ✓ k/k : 1 (1)

ii) $(3x - 1)(x + 2) \geq 0$ ✓



k/k : 2

(3)

$x \leq -2$ or $x \geq \frac{1}{3}$ ✓

b) $\sqrt{\frac{2^3 \cdot 2^n + 2^n}{2^n \cdot 2^{-2}}}$ ✓ k/k : 4

$= \sqrt{\frac{2^n(8+1)}{2^n(2^{-2})}}$ ✓ c : 3

$= \sqrt{36}$ ✓

$= 6$ ✓ (4)

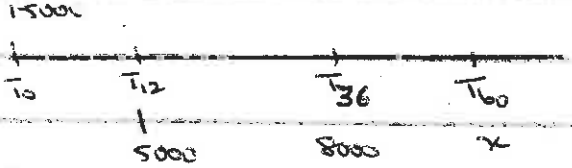
c) $\Delta = b^2 - 4ac$

$= (-p)^2 - 4(1)(-5)$ ✓ c : 4

$= p^2 + 20 > 0$ ✓

∴ real ✓ unequal ✓ roots (4)

9



$P_0 = 15000$

$A_1 = 15000\left(1 + \frac{0,07}{12}\right)^{12}$ ✓

$P_1 = (A_1 - 5000)$ ✓ c : 7

$A_2 = (A_1 - 5000)\left(1 + \frac{0,07}{12}\right)^{24}$

$P_2 = (A_2 - 8000)$ ✓

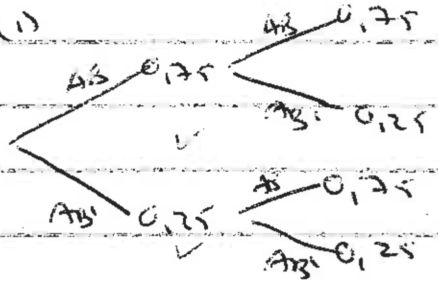
$A_3 = x = (A_2 - 8000)\left(1 + \frac{0,07}{12}\right)^{24}$

$x = R54\,55,66$ ✓ (7)

OR

$15000\left(1 + \frac{0,07}{12}\right)^{60} - 5000\left(1 + \frac{0,07}{12}\right)^{48} - 8000\left(1 + \frac{0,07}{12}\right)^{24}$

10 a)(i)



(4)

ii) $(0,75)(0,75) + (0,75)(0,25)\times 2$

$= \frac{15}{16} = 0,9375$

OR $1 - (0,25)(0,25)$ (2)

$= 0,9375$

b) $P(A \cup B) = P(A) + P(B) - P(A)P(B)$

$0,65 = (x) + (x - 0,2) - x(x - 0,2)$

$65 = 100x + 100x - 20 - 100x^2 + 20x$

$100x^2 - 220x + 85 = 0$

$x = \dfrac{220 \pm \sqrt{(220)^2 - 4(100)(85)}}{200}$

$x = 1,7$ (N/A), $0,5$ (5)

$((10x - 17)(10x - 5) = 0)$

11 a) $x = -4$

b) $y = b^x - 4$

$5 = b^2 - 4$

$9 = b^2$

$b = 3$

$\therefore y = 3^x - 4$ (3)

c) $x = -2$; $y = -1$ (2)

d) $f: y = \dfrac{a}{x+2} - 1$

Subst $(2;0)$: $0 = \dfrac{a}{4} - 1$

$1 = \dfrac{a}{4}$ (2)

$4 = a$

$g: y = \dfrac{4}{x+2} - 1$

e) $x = 0$ (1)

f) $(-2;0) \cup (0;\infty)$ (2)

OR $(-2;\infty)$, $x \neq 0$

12 a) $2^m \cdot 3^n = 2^6 \cdot 2^4 \cdot 3^4$

$m = 10$; $n = 4$

$m - n = 6$ (4)

b) $x^2 - 3x = 0$

$x(x - 3) = 0$

$x = 0$ or $x = 3$ (4)

$\therefore$ Sum $= 3$