Grade 11 Paper 1 2015

Question 1

1.11 $x^2+x-12=0$

$(x+4)(x-3)=0$

$x=-4$ or $x=3$

1.12 $\sqrt{2x+1}=x-1$

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

$2x+1=x^2-2x+1$

$0=x^2-4x$

$0=x(x-4)$

$x\neq 0$ or $x=4$

1.13 $2^{x\sqrt{x}}=2^{27}$

$x\,x^{1/2}=27$

$x^{3/2}=27$

$x=(3^3)^{2/3}$

$x=3^2$

$x=9$

1.14 $x^2-2x-8<0$

$(x-4)(x+2)<0$

CVS: $x=4$ $x=-2$

$+$ $-$ $+$

-2 4

$-2<x<4$

1.2 $f(x)=5x^2+6x-7$

1.2.1 $0=5x^2+6x-7$

$x=\frac{-6\pm\sqrt{6^2-4(5)(-7)}}{2(5)}$

$x=0{,}73$ or $x=-1{,}93$

1.2.2 $5x^2+6x-d=0$

$\Delta=(6)^2-4(5)(-d)$

$0=36+20d$ $\Delta=0$ for equal roots

$-36=20d$

$-\frac{9}{5}=d$

1.3 $x-2y=-3$

$x=-3+2y$

$xy=20$

$(-3+2y)y=20$

$-3y+2y^2=20$

$2y^2-3y-20=0$

$(2y+5)(y-4)=0$

$y=-\frac{5}{2}$ or $y=4$

$x=-3+2\left(-\frac{5}{2}\right)$ or $x=-3+2(4)$

$=-8$ $=5$

Question 2

2.1.1 $\frac{2^{n+2}\ 4^{n+1}}{8^{n-1}}$

$\frac{2^{n+2} \cdot 2^{2n+2}}{2^{3n-3}}$

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

$= 2^7$

2.1.2 $\sqrt{x+\sqrt{2x-1}} \cdot \sqrt{x-\sqrt{2x-1}}$

$= \sqrt{x^2-(2x-1)}$

$= \sqrt{x^2-2x+1}$

$= \sqrt{(x-1)^2}$

$= x-1$

2.2 $p = \sqrt{\frac{5}{x+2}} + \frac{x}{3}$

real if $\frac{5}{x+2} > 0$

$x+2 > 0$

$x > -2$

2.2.1 $p = \sqrt{\frac{5}{3+2}} + \frac{3}{3}$

$= \sqrt{1} + 1$

$= 2$

$\therefore$ p is rational.

2.3 $2^{2015} \times 5^{2019}$

$2^{2015} \times 5^{-2015} \times 5^4$

$(2 \times 5)^{2015} \times 5^4$

$10^{2015} \times 625$ $\therefore$ sum = 13

Question 3

3.1 5; -2; -9; ... ; -289.

3.1.1 -7

3.1.2 -16

3.1.3 $T_n = 5 + (n-1) \cdot -7$

$= 5 - 7n + 7$

$-289 = -7n + 12$

$-301 = -7n$

$43 = n$

3.2 $T_{20} = 64$

3.2.1 $T_{21} = 67$

$T_{22} = 70$.

3.2.2 $3T_5 - 2$

$3(19) - 2$

$= 55$

$T_n = 7 + (n-1) \cdot +3$

$= 7 + 3n - 3$

$= 3n + 4$

$55 = 3n + 4$

$51 = 3n$

$17 = n$

$T_5 = a + (n-1) \cdot 3$

$T_{22} = a + (n-1) \cdot 3$

$70 = a + (22-1) \cdot 3$

$70 = a + 63$

$7 = a$

$T_5 = 7 + 3(5) - 3$

$= 19$

3.3 5; 12; 29; 56

7 (+10) 17 (+10) 27

7; 17; 27

$T_n = 7 + (n-1) \cdot 10$

$= 7 + 10n - 10$

$= 10n - 3$ $\therefore$ $10 \times n$ will be even

$\therefore$ $10n - 3$ will be odd.

Question 7

7.1 $CD = 2x+3-(-2x^2+14x+k)$
$= 2x+3+2x^2-14x-k$
$= 2x^2-12x+3-k$

7.2 $CD = 2(x^2-6x+3/2)-k$
$= 2(x^2-6x+(-3)^2-(-3)^2+\frac{3}{2})-k$
$= 2((x-3)^2-9+\frac{3}{2})-k$

$= 2(x-3)^2-18+3-k$
$= 2(x-3)^2-15-k$

$\therefore -15-k = 5$
$-15-5 = k$
$-20 = k$

Question 8

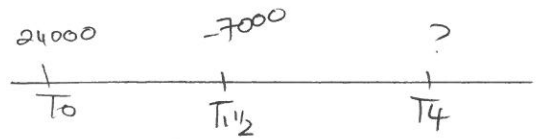
8.1 $P = 140000$
$i = 0,061$
$n = 4$
$A = ?$

$A = p(1+i)^n$
$= 140000(1+0,061)^4$
$= R177414,69$

8.2 $1+i_{eff} = \left(1+\frac{i_{nom}}{m}\right)^m$
$1+i_{eff} = \left(1+\frac{0,07}{2}\right)^2$

$1+i_{eff} = 1,071225$
$i_{eff} = 0,071225$
$\therefore 7,12\%$

8.3



$\frac{0,105}{12}$

$A = 24000\left(1+\frac{0,105}{12}\right)^{4\times12} - 7000\left(1+\frac{0,105}{12}\right)^{2\frac{1}{2}\times12}$
$= 27369,56$

8.4 $A = 102755,34$
$P = 198000$
$n = 3$

$A = P(1-i)^n$
$102755,34 = 198000(1-i)^3$
$0,51896 = (1-i)^3$
$0,8036 = 1-i$
$-0,1964 = -i$
$19,64\% = i$

Question 9

9.1 $P(A \text{ or } B) = P(A)+P(B)$ if mutually exclusive
$P(A \text{ or } B) = 0,8$
$P(A)+P(B)$
$96+93$
$= 0,9$
$\therefore$ No, not mutually exclusive

9.2a) $P(\text{Area 1}) = \frac{1832}{2646}$
$= \frac{916}{1323} = 0,69$

b) $\frac{460}{2646}$
$= \frac{230}{1323} = 0,17$.

c) $\frac{354}{2646} = \frac{59}{441} = 0,13$.

922: $P(A) \times P(B) = P(A \text{ and } B)$ if independent.

$P(>3200) \times P(\text{Area 1})$ $\qquad$ $P(>3200 \text{ and Area 1})$

$\frac{960}{2646} \times \frac{1832}{2646}$ $\qquad$ $\frac{500}{2646}$

$= 925$ $\qquad$ $= 919$

$\therefore$ Not Independent

923 $P(A1 \text{ and } >3200) = \frac{500}{1832}$

$= 27,29\%$.

$P(A2 > 3200) = \frac{460}{514}$

$= 56,51\%$.

$\therefore$ more likely to live in Area 2.