

GRADE : 11
 SUBJECT : Mathematics
 TITLE : Nov P 1
 EXAMINER : Mr A. Slaughter DOE
 TOTAL MARKS : 150

DATE : 18 / 11 / 20 13

SOLUTIONS

TIME : 3 hour(s)

1.1.	$x = \frac{5}{3x-2}$			$= 3^3 \cdot x^{-3} \checkmark$	
	LCD = $3x-2$			$= \frac{27}{x^3}$	2
	$(\therefore x \neq \frac{2}{3})$			\xrightarrow{D}	
	$x \neq \text{then}$		1.3.	2. $4(3-\sqrt{5})(3+\sqrt{5})$	
	$x(3x-2) = 5$			$= 4(9-5) \checkmark \text{dos}$	
	$3x^2 - 2x - 5 = 0 \checkmark$			$= 16 \checkmark$	2
	$(3x-5)(x+1) = 0 \checkmark$			\xrightarrow{D}	
	$\therefore x = \frac{5}{3} \text{ or } -1 \checkmark$	3			
	\xrightarrow{D}				
1.2.	1. $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \checkmark$	1	2.1.	1. $\frac{4x^2 + 2x + 1}{4x^2 - 2x + 1} = k$	
	\xrightarrow{D}			LCD = $4x^2 - 2x + 1$	
	2. $x(3x+13) = 11$			$(\therefore x \neq \mathbb{R}')$	
	$3x^2 + 13x - 11 = 0 \checkmark$			$x \neq \text{then}$	
	$x = \frac{-(13) \pm \sqrt{(13)^2 - 4(3)(-11)}}{2(3)} \checkmark$			$4x^2 + 2x + 1 = k(4x^2 - 2x + 1)$	
	$= \frac{-13 \pm \sqrt{301}}{6}$			$4x^2 + 2x + 1 = 4kx^2 - 2kx + k$	
	$= 0,72 \text{ or } -5,06 \checkmark$	4		$4x^2 - 4kx^2 + 2x + 2kx + 1 - k = 0$	
	\xrightarrow{D}			$x^2(4-4k) + x(2+2k) + (1-k) = 0 \checkmark$	3
1.3.	1. $(81x^{-4})^{\frac{3}{4}}$		2.1.	2. Δ	
	$= (\sqrt[4]{3^4} x^{-4})^{\frac{3}{4}}$			$= (2+2k)^2 - 4(4-4k)(1-k)$	

	$= 4 + 8k + 4k^2 - 4(4 - 4k - 4k + 4k^2)$			$= \frac{3^{2x}}{3^{2x}}$	
	$= 4 + 8k + 4k^2 - 4(4 - 8k + 4k^2)$			$= 1$ ✓	3
	$= 4 + 8k + 4k^2 - 16 + 32k - 16k^2$			$\frac{1}{1}$	
	$= -12k^2 + 40k - 12$ ✓		2.4.	$(x+1)(2x-3) > 3$	
	For Real roots			$2x^2 - x - 3 > 3$	
	$\Delta \geq 0$			$2x^2 - x - 6 > 0$ ✓	
	$-12k^2 + 40k - 12 \geq 0$ ✓			$(2x+3)(x-2) > 0$ ✓	
	$\div -4: 3k^2 - 10k + 3 \leq 0$ ✓			$\frac{+9}{-3/2} - \frac{0}{2}$	
	$(3k-1)(k-3) \leq 0$ ✓			$x < -\frac{3}{2}$ or $2 < x$	4
	$\frac{+}{-} \frac{0}{1/3} \frac{-}{+} \frac{0}{3} \frac{+}{-}$			$\frac{1}{3} \leq k \leq 3$ ✓	
	$\frac{1}{3} \leq k \leq 3$ ✓	5	2.5.	$2x-y=3$	
				$27^{\frac{2x}{3}} = 3^{y-1}$	
				$\dots 1$	
				$(3^3)^{\frac{2x}{3}} = 3^{y-1}$ ✓	
				$3^x = 3^{y-1}$ ✓	
				$x = y-1$	
2.2.	$\sqrt{108} - \sqrt{18}$			$\dots 2$	
	$= \sqrt{36 \cdot 3} - \sqrt{9 \cdot 2}$ ✓ $36 \cdot 3 = 9 \cdot 2$			$(2) \rightarrow (1): 2(y-1) - y = 3$ ✓	
	$= 6\sqrt{3} - 3\sqrt{2}$			$2y - 2 - y = 3$	
	$= 6b - 3a$ ✓	2		$y = 5$ ✓	
				$x = 5 - 1$	
2.3.	$\frac{3^{x+3} \cdot 12^{x-3}}{2^{2x-6} \cdot 9^x}$			$= 4$ ✓	
	$\cdot 12^{x-3} = (2^2 \cdot 3)^{x-3}$			$\therefore x = 4 \text{ and } y = 5$ ✓	6
	$= 2^{2x-6} \cdot 3^{x-3}$ ✓				
	$\cdot 9^x = (3^2)^x$				
	$= 3^{2x}$ ✓				
	$\therefore \frac{3^{x+3} \cdot 2^{2x-6} \cdot 3^{x-3}}{2^{2x-6} \cdot 3^{2x}}$				

3.1.	$y = \frac{\sqrt{3x}}{3-x}$			$0 = (x+2)(x+22)$	
				$\therefore x = -2$ or -22	5
3.1.	1. VD: den = 0			$\checkmark \rightarrow$ \checkmark reject	
	$3-x = 0$				
	$3 = x$	2	4.1.	$A = P(1-in)$	
				$= 15000(1 - \frac{12}{100} \cdot 6)$	
3.1.	2. R: $x \geq 0$ and $x \neq 3$	2		$= R 4\ 200$	3
3.2.	$\sqrt{5-2x} = \frac{x}{2} + 4$		4.2. 1.	15% pa com m'ly	1
3.2.	1. $5-2x \geq 0$ and $\frac{x}{2} + 4 \geq 0$		4.2. 2.	15% pa comp monthly	
	$-2x \geq -5$ $\frac{x}{2} \geq -4$			$\frac{15}{1200}$ pm comp monthly	
	$x \leq \frac{5}{2}$ $x \geq -8$			$= i_{12}$	
	$\therefore -8 \leq x \leq \frac{5}{2}$	5		$(1+i_k)^k = 1+i_{pa}$	
3.2.	2. $\sqrt{5-2x} = \frac{x}{2} + 4$			$(1+i_{12})^{12} = 1+i_{pa}$	
	LCD = 2			$(1 + \frac{15}{1200})^{12} = 1+i_{pa}$	
	x thru			$0,1607... = i_{pa}$	
	$2\sqrt{5-2x} = x+8$			$\therefore 16,1\%$ pa	4
	$(2\sqrt{5-2x})^2 = (x+8)^2$		4.2. 3.	$A = P(1+i)^n$	
	$4(5-2x) = x^2 + 16x + 64$			$= 2500(1 + \frac{15}{1200})^{84}$	
	$20 - 8x = x^2 + 16x + 64$			$= R 7097,78$	3
	$0 = x^2 + 24x + 44$			\textcircled{OR}	

$$A = 2500 \left(1 + \frac{16,1}{100}\right)^7$$

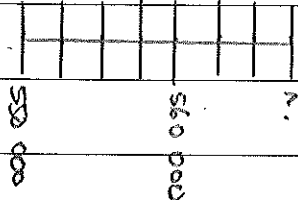
$$= R 7 108,30 \checkmark$$

$$= 949 693,60 \dots$$

$$\therefore 1886 334,99 \dots + 949 693,60 \dots$$

$$= R 2 836 028,60 \checkmark$$

4.3. yrs: 0 1 2 3 4 5 6 7



1 18% pa q'ly 1

• Snowball

$T_0 - T_4$:

$$A = P(1+i)^n \quad \checkmark \text{ in}$$

$$= 550 000 \left(1 + \frac{18}{400}\right)^{16} \quad \checkmark \text{ f+p}$$

$$= 1 112 303,58 \dots$$

$T_4 - T_7$: f+p

$$A = 1672 303,58 \dots \left(1 + \frac{18}{400}\right)^{12} \quad \checkmark \text{ in}$$

$$= R 2 836 028,60 \checkmark \quad \mathbf{5}$$

• Parallel

550 000 :

$$A = P(1+i)^n \quad \checkmark$$

$$= 550 000 \left(1 + \frac{18}{400}\right)^{28} \quad \checkmark$$

$$= 1 886 334,99 \dots$$

560 000 :

$$A = 560 000 \left(1 + \frac{18}{400}\right)^{12} \quad \checkmark$$

5.1. $R 4 000 \checkmark$

1

5.2. $P \approx 15 000 \quad i = ?$

$A = 4000 \quad n = 8,5$

$A = P(1 - in)$

$4000 = 15000(1 - i \cdot 8,5)$

$\frac{4}{15} = 1 - 8,5i$

$i = \frac{22}{255} \checkmark \quad 0,086 \dots$

$I = 8,63 \% \checkmark \text{ pa} \quad \mathbf{2}$

5.3.

$A = P(1 - i)^n$

$4000 = 15000(1 - i)^{8,5}$

$\frac{4}{15} = (1 - i)^{\frac{17}{2}}$

$\left(\frac{4}{15}\right)^{\frac{2}{17}} = \left((1 - i)^{\frac{17}{2}}\right)^{\frac{2}{17}}$

$0,85 \dots = 1 - i$

$i = 0,144 \dots \checkmark$

$I = 14,4 \% \checkmark \text{ pa} \quad \mathbf{2}$

6.1.	Fig	1	2	3	4	6	11			7.1.	1; 5; 11; 19; 29 ✓	1
	Bl	2x2 4	4x4 16	6x6 36	8x8 64	12x12 144	22x22 484				$\begin{array}{cccc} \sqrt{\quad} & \sqrt{\quad} & \sqrt{\quad} & \sqrt{\quad} \\ 4 & 6 & 8 & 10 \\ \hline & 2 & 2 & 2 \end{array}$	
	Wh	1	3x3 9	5x5 25	7x7 49	11x11 121	21x21 441					
	To	5	25	61	113	265	925	5				

6.2.

$$(2n)^2$$

$$(2n-1)^2$$

$$\therefore T_n = (2n)^2 + (2n-1)^2$$

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

$$= 4n^2 + 4n^2 - 4n + 1$$

$$= 8n^2 - 4n + 1 \quad \checkmark$$

7.2.

$$2a = d_2 \quad 3a + b = d_1 \quad a + b + c = T_1$$

$$2a = 2 \quad 3(1) + b = 4 \quad 1 + 1 + c = 1$$

$$a = 1 \quad b = 1 \quad c = -1$$

$$\therefore T_n = n^2 + n - 1 \quad \checkmark$$

7.3.

$$T_{100} = (100)^2 + (100) - 1$$

$$= 10099$$

$$5; 25; 61; 113;$$

$$\begin{array}{cc} \sqrt{\quad} & \sqrt{\quad} \\ 20 & 36 \\ \hline & 52 \end{array}$$

$$\begin{array}{cc} \sqrt{\quad} & \sqrt{\quad} \\ 16 & 16 \end{array}$$

8. $f: y = 2 \cdot 3^x - 1$ $g: y = \frac{4}{x+3}$

$$2a = d_2 \quad 3a + b = d_1 \quad a + b + c = T_1$$

$$2a = 16 \quad 3(8) + b = 20 \quad 8 + (-4) + c = 5$$

$$a = 8 \quad b = -4 \quad c = 1$$

$$\therefore T_n = 8n^2 - 4n + 1$$

$$\checkmark \quad \checkmark \quad \checkmark$$

8.1. ha: $y = -1 \quad \checkmark$

8.2. y int: $y = 2 \cdot 3^0 - 1 = 1 \quad \checkmark$

$$\therefore (0; 1) \quad \checkmark$$

8.3. x int: $0 = 2 \cdot 3^x - 1$

$$\therefore \frac{1}{2} = 3^x$$

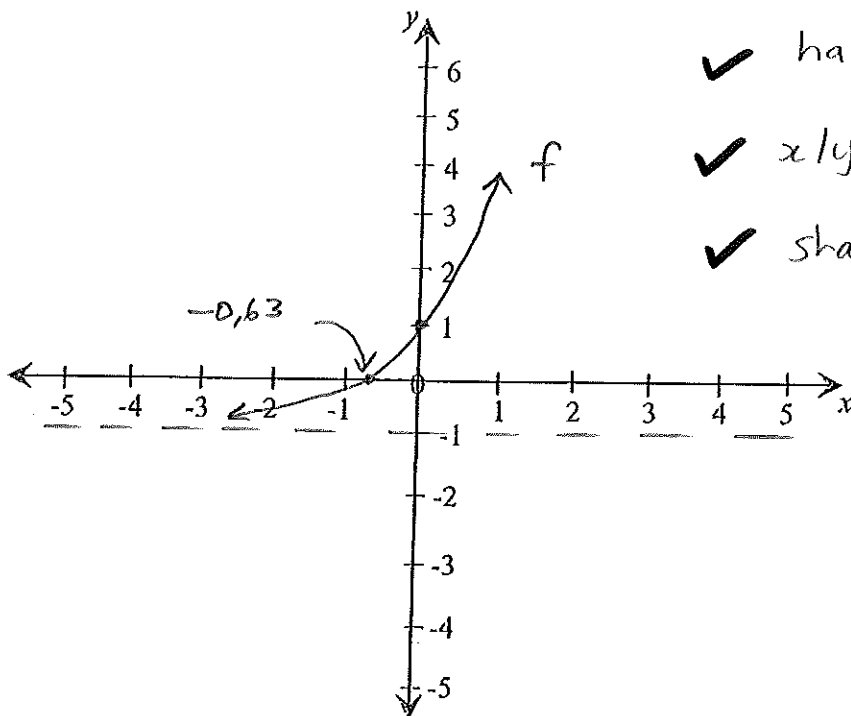
$$x = \frac{\log \frac{1}{2}}{\log 3}$$

	$x = -0,63$			$= \frac{\Delta y}{\Delta x}$	
	$\therefore (-0,63; 0)$ ✓ ✓ →	2		$= \frac{1-4}{1-(-2)}$	
				$= -1$ ✓ →	3
8.4.	d/sheet				
8.5.	Rf: $y \in (-1; \infty)$ ✓ →	1	9.1. 1.	$x_1 = -2 \quad x_2 = 3$	
				$\therefore y = a(x+2)(x-3)$ ✓	
8.6.	ha: $y = 0$ ✓ →			Sub (0; -12)	
	va: $x+3=0 \therefore x = -3$ ✓ →	2		$-12 = a(0+2)(0-3)$ ✓	
				$-12 = -6a$	
8.7.	yint: $y = \frac{4}{0+3} = \frac{4}{3}$ ✓ ✓ →			$2 = a$ ✓	
	$\therefore (0; \frac{4}{3})$ ✓	2		$\therefore y = 2(x+2)(x-3)$ ✓	
				$= 2(x^2 - x - 6)$	
8.8.	Aos: $y = x+3$ ✓ or $y = -x-3$ ✓ →	2		$= 2x^2 - 2x - 12$ ✓	4
8.9.	d/sheet		9.1. 2.	y	
				$= \sqrt{2[x^2 - x + (-\frac{1}{2})^2 - (-\frac{1}{2})^2]} - 12$	
8.10.	$y = \frac{4}{x+3}$			$= \sqrt{2[(x - \frac{1}{2})^2 - \frac{1}{4}]} - 12$	
	$x = -2 \quad x = 1$			$= 2(x - \frac{1}{2})^2 - \frac{1}{2} - 12$	
	$y = \frac{4}{-2+3} \quad y = \frac{4}{1+3}$			$= \sqrt{2(x - \frac{1}{2})^2 - \frac{25}{2}}$ ✓ →	3
	$= 4 \quad = 1$				
	$\therefore (-2; 4)$ ✓ $\therefore (1; 1)$ ✓				
	av grad				

NAME/NAAM:

SUT

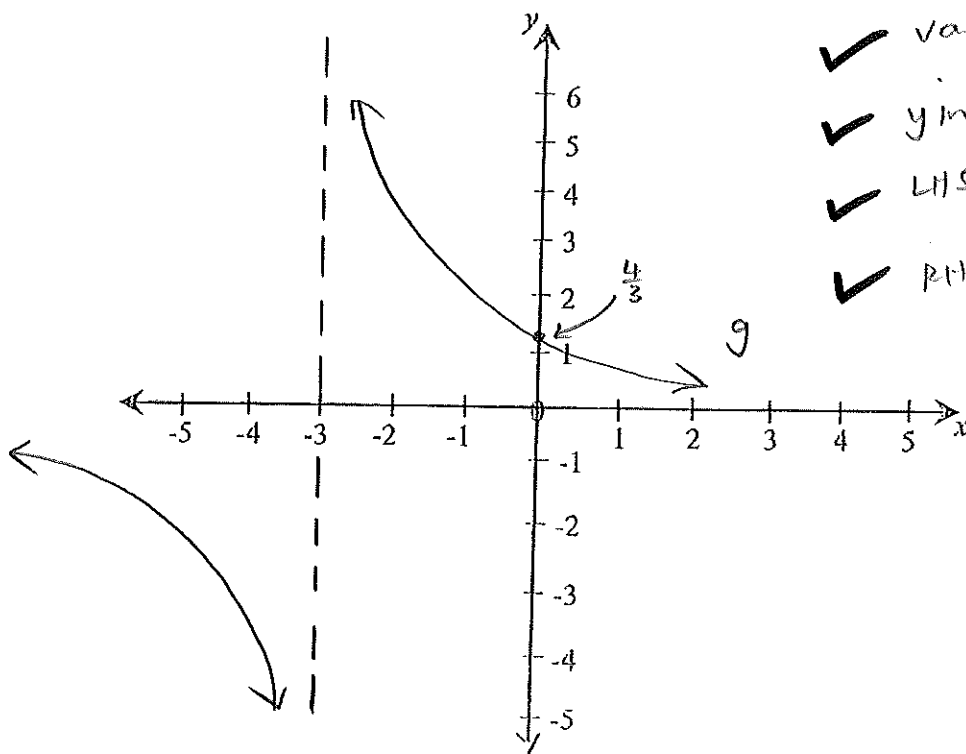
QUESTION/VRAAG 8.4



- ✓ ha
- ✓ x/y ints
- ✓ shape

3

QUESTION/VRAAG 8.9

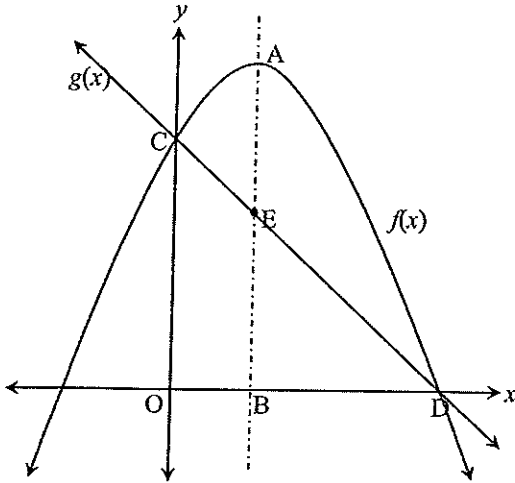


- ✓ va
- ✓ y int
- ✓ LHS branch
- ✓ RHS branch

4

9.2. $f: y = -x^2 + x + 12$

$g: y = mx + c$



$= \frac{49}{4} \checkmark 12,25$

$y_E = -3\left(\frac{1}{2}\right) + 12$

$= \frac{21}{2} \checkmark 10,5$

$\therefore AE = y_A - y_E$

$= \frac{49}{4} - \frac{21}{2}$

$= \frac{7}{4} \checkmark 1,75$

3

9.2. 4. Decr = down $L \rightarrow R$

$x \in \left(\frac{1}{2}; \infty\right) \checkmark$

1

9.2. 1. $y_{int}: y = 12 \therefore c(0; 12) \checkmark$

$x_{int}: 0 = -x^2 + x + 12$

fact $x^2 - x - 12 = 0$
 $(x - 4)(x + 3) = 0$

$x = 4 \text{ or } -3$

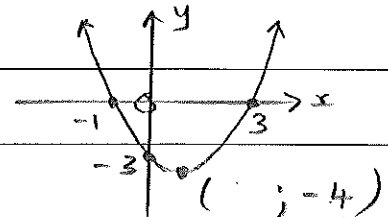
$\therefore D(4; 0) \checkmark$

3

9.2. 5. $R_f: y \in \left(-\infty; \frac{49}{4}\right] \checkmark$

1

10.1.



$y = a(x + 1)(x - 3) \checkmark$

sub $(0; -3)$

$-3 = a(0 + 1)(0 - 3) \checkmark$

$-3 = -3a$

$1 = a$

$\therefore y = (x + 1)(x - 3) \checkmark$

3

9.2. 3. $x_B = \frac{1}{2}$

$y_A = -\left(\frac{1}{2}\right)^2 + \left(\frac{1}{2}\right) + 12$

(OR)

$$x_{tp} = \frac{3 \cdot (-1)}{2} = 1$$

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

$$y = a(x-1)^2 - 4 \checkmark$$

$$\text{sub } (0; -3)$$

$$-3 = a(0-1)^2 - 4 \checkmark$$

$$1 = a$$

$$\therefore y = (x-1)^2 - 4 \checkmark$$

$$\text{II. } P(M) \quad \leftarrow \text{mate}$$

$$= \frac{1731}{2201} \checkmark$$

$$P(N) \quad \leftarrow \text{not survive}$$

$$= \frac{1490}{2201} \checkmark$$

$$P(M \text{ and } N) \quad \leftarrow \text{mate} \quad \leftarrow \text{not survive}$$

$$= \frac{1364}{2201}$$

$$= \frac{44}{71} \checkmark \quad 0,619 \dots$$

$$P(M) \times P(N)$$

$$= \frac{1731}{2201} \times \frac{1490}{2201}$$

$$= 0,532 \dots$$

$$\therefore P(M \text{ and } N) \neq P(M) \times P(N)$$

\therefore M and N are

dependent \checkmark

4

(not independent!)

$$12.1. \quad P(A) = 0,4 \quad P(B) = 0,5$$

$$\frac{2}{5} \quad \frac{1}{2}$$

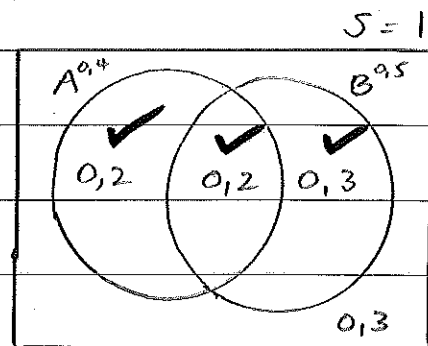
12.1. 1. Independent

$$\therefore P(A \text{ and } B)$$

$$= P(A) \times P(B)$$

$$= 0,4 \times 0,5$$

$$= 0,2 \quad \frac{1}{5}$$



$$\therefore P(A \cup B)$$

$$= 0,2 + 0,2 + 0,3$$

$$= 0,7 \checkmark$$

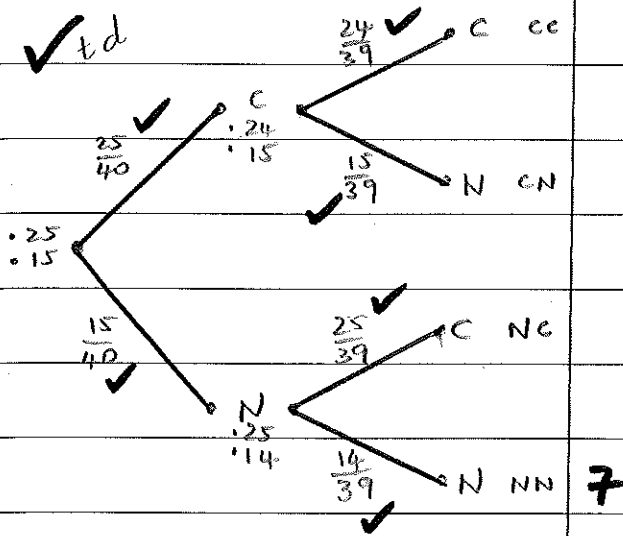
4

$$12. 2. P((A \cup B)')$$

$$= 0,3 \checkmark$$

1

12.2. 1. C = cell N = no cell



12.2. 2. $P(CN \text{ or } NC)$

$$= P(CN) + P(NC)$$

$$= \frac{25}{40} \times \frac{15}{39} + \frac{15}{40} \times \frac{25}{39}$$

$$= \frac{25}{104} + \frac{25}{104}$$

$$= \frac{25}{52} \quad 0,48$$

3