



Toets, kwartaal 1, 2023 – Memorandum

Vraag 1

1.1 Vereenvoudig sonder die gebruik van 'n sakrekenaar:

1.1.1 $\frac{2^{2023} - 2 \cdot 2^{2021}}{\sqrt{4^{2022}}}$ (5)

$$= \frac{2^{2023} - 2^{2022} \checkmark}{\sqrt{2^{4044}} \checkmark}$$

$$= \frac{2^{2022}(2-1) \checkmark}{2^{2022} \checkmark}$$

$$= 1 \checkmark$$

1.1.2 $\frac{(y^a)^2 - 9}{y^{2a} - 4y^a - 21}$ (3)

$$= \frac{(y^a - 3)(y^a + 3) \checkmark}{(y^a - 7)(y^a + 3) \checkmark}$$

$$= \frac{(y^a - 3) \checkmark}{(y^a - 7)}$$

1.1.3 $\frac{\sqrt{28x^{10}} - \sqrt{7x^5} + x\sqrt{63(x^4)^2}}{x^5(\sqrt{6} - \sqrt{2})(\sqrt{6} + \sqrt{2})}$ (5)

$$= \frac{\sqrt{7 \times 4x^{10}} - \sqrt{7x^5} + x\sqrt{7 \times 9x^8}}{x^5(6-2)}$$

$$= \frac{2\sqrt{7x^5} \checkmark - \sqrt{7x^5} + 3\sqrt{7x^5} \checkmark}{4x^5 \checkmark}$$

$$= \frac{4\sqrt{7x^5} \checkmark}{4x^5}$$

$$= \sqrt{7} \checkmark$$

1.1.4 $\sqrt{2x - \sqrt{4x - 1}} \times \sqrt{2x + \sqrt{4x - 1}}$ (5)

$$= \sqrt{[2x - \sqrt{4x - 1}][2x + \sqrt{4x - 1}]}$$

$$= \sqrt{4x^2 \checkmark - (4x - 1) \checkmark}$$

$$= \sqrt{4x^2 - 4x + 1} \checkmark$$

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

$$= 2x - 1 \checkmark$$

1.2 Bereken en laat jou antwoord met 'n rasionale noemer:

$$\frac{2}{\sqrt{5}} - \frac{\sqrt{5}}{2} \quad (5)$$

$$= \frac{4-5}{2\sqrt{5}\checkmark}$$

$$= \frac{-1\checkmark}{2\sqrt{5}}$$

$$= \frac{-1}{2\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}} \checkmark$$

$$= \frac{-\sqrt{5}}{2.5}$$

$$= \frac{-\sqrt{5}\checkmark}{10\checkmark}$$

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Vraag 2

2.1 Los op vir x in elkeen van die volgende vergelykings:

2.1.1 $\sqrt{x} = 17x^{\frac{1}{4}} - 16$ (4)

$$x^{\frac{1}{2}} - 17x^{\frac{1}{4}} + 16 = 0\checkmark$$

$$(x^{\frac{1}{4}} - 16)(x^{\frac{1}{4}} - 1) = 0\checkmark$$

$$x^{\frac{1}{4}} = 16 \quad \text{OF} \quad x^{\frac{1}{4}} = 1$$

$$x = (2^4)^4 \quad x = (1)^4$$

$$x = 65536\checkmark \quad x = 1\checkmark$$

2.1.2 $2x - \sqrt{14x - 12} = 0$ (5)

$$2x = \sqrt{14x - 12}$$

$$4x^2 = 14x - 12\checkmark$$

$$2x^2 - 7x + 6 = 0\checkmark$$

$$(x - 2)(2x - 3) = 0\checkmark$$

$$x = 2\checkmark \quad \text{OF} \quad x = \frac{3}{2}\checkmark$$

2.1.3 $6x - x(x - 1) = 2$ (5)

$$6x - x^2 + x - 2 = 0\checkmark$$

$$x^2 - 7x + 2 = 0\checkmark$$

$$x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(1)(2)}}{2(1)}\checkmark$$

$$x = 0,3\checkmark \quad \text{OF} \quad x = 6,7\checkmark$$

2.2 Los op vir x :

$-x^2 \leq x - 2$ (4)

$$-x^2 - x + 2 \leq 0$$

$$x^2 + x - 2 \geq 0\checkmark$$

$$(x + 2)(x - 1) \geq 0\checkmark$$

$$x \leq -2\checkmark \cup x \geq 1\checkmark$$

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Vraag 3

3.1 Los op vir x en y :

$$3^x \cdot 3^{-y} = \sqrt[3]{\left(\frac{1}{9}\right)^6} \quad \text{en} \quad x^2 - y^2 = xy + 4 \quad (8)$$

$$3^{x-y} = \sqrt[3]{(3^{-2})^6}$$

$$3^{x-y} = \sqrt[3]{3^{-12}}$$

$$3^{x-y} = 3^{-4}$$

$$x - y = -4 \rightarrow x = y - 4 \dots \dots \dots (1) \checkmark$$

Stel (1) in:

$$(y - 4)^2 - y^2 = y(y - 4) + 4 \checkmark$$

$$y^2 - 8y + 16 - y^2 = y^2 - 4y + 4$$

$$0 = y^2 + 4y - 12 \checkmark$$

$$0 = (y + 6)(y - 2) \checkmark$$

$$y = -6 \quad \text{OF} \quad y = 2 \checkmark$$

$$\therefore x = -10 \quad \text{OF} \quad \therefore x = -2 \checkmark$$

3.2 Gegee: $m(x) = 4 + x(2x - 1)$

Bepaal die aard van die wortels van $m(x) = 0$ sonder om die vergelyking op te los. (4)

$$0 = 2x^2 - x + 4 \checkmark$$

$$\Delta = (-1)^2 - 4(2)(4) \checkmark$$

$$\Delta = -31 \checkmark$$

\therefore Die wortels van $m(x)$ is nie-reëel \checkmark

3.3 Bepaal die waarde(s) van a waarvoor die vergelyking $3ax^2 = 2x - 3a$ gelyke wortels sal hê. (4)

$$3ax^2 - 2x + 3a = 0$$

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

$$1 = 9a^2$$

$$\pm \sqrt{\frac{1}{9}} = a$$

$$\pm \frac{1}{3} = a \checkmark \checkmark$$

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Vraag 4

4.1 Beskou die volgende kwadratiese getalpatroon en beantwoord die vrae wat volg:
 $-1; -2; -7; -16; \dots$

4.1.1 Bepaal die algemene term van die eerste verskille. (3)

$$-1; -5; -9; \dots \checkmark$$

$$T_n = -4n \checkmark + 3 \checkmark$$

4.1.2 Tussen watter twee terme in die kwadratiese ry sal die eerste verskil -33 wees? (3)

$$-33 = -4n + 3 \checkmark$$

$$-36 = -4n$$

$$9 = n \checkmark$$

\therefore Tussen die negende en tiende term van die kwadratiese ry. \checkmark

4.1.3 Bepaal die n^{de} term van die kwadratiese ry. (4)

$$2a = -4$$

$$3a + b = -1$$

$$a + b + c = -1$$

$$a = -2 \checkmark$$

$$3(-2) + b = -1$$

$$(-2) + b + c = -1$$

$$b = 5 \checkmark$$

$$c = -4 \checkmark$$

$$T_n = -2n^2 + 5n - 4 \checkmark$$

4.1.4 Is -60 'n term in die kwadratiese ry? Motiveer jou antwoord met berekening. (5)

$$-60 = -2n^2 + 5n - 4 \checkmark$$

$$2n^2 - 5n - 56 = 0 \checkmark$$

$$n = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(2)(-56)}}{2(2)} \checkmark$$

$$n \neq -4,19 \quad \text{OF} \quad n \neq 6,69 \checkmark$$

Nee \checkmark , indien -60 'n term in die kwadratiese ry was, moes $n \in Z$ wees waar $Z > 0$.

4.2 Die n^{de} term van 'n kwadratiese getalpatroon is $T_n = an^2 + bn + c$. Die algemene reël van die eerste verskille is $4n + 3$ en die waarde van die eerste term in die kwadratiese patroon is 1. Bepaal die waardes van a , b en c . (3)

$$\text{Ry : } 1; 8; 19$$

$$7; 11$$

$$4$$

$$2a = 4$$

$$3a + b = 7$$

$$a + b + c = -1$$

$$a = 2 \checkmark$$

$$3(2) + b = 7$$

$$2 + 1 + c = -1$$

$$b = 1 \checkmark$$

$$c = -2 \checkmark$$

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Totaal: [75]