higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NASIENRIGLYN

NASIONALE SERTIFIKAAT

WISKUNDE N4

28 MAART 2018

Hierdie nasienriglyn bestaan uit 9 bladsye.

Kopiereg voorbehou

VRAAG 1

1.1

$$\int (x) = 3x^2 + 10x + 2$$

$$0 = 3x^2 + 10x + 2 \quad \checkmark$$

$$x = \frac{10 \pm \sqrt{76}}{6} \quad \checkmark$$

$$x_1 = \ 0{,}214; x_2 = 3{,}12 \quad \checkmark$$

$$y_1 = (0{,}214)^3 + 5(0{,}214)^2 + 2(0{,}214) - 8$$
$$= 8{,}209 \quad \checkmark$$

$$y_2 = (3{,}12)^3 + 5(3{,}12)^2 + 2(3{,}12) - 8$$
$$= 4{,}061 \quad \checkmark$$

$$TPS: (0{,}214;\ 8{,}209); (3{,}12;\ 4{,}061)$$

$$P.O.I.: \frac{d^2y}{dx^2} = 6x + 10$$

$$x = \frac{5}{3} \quad \checkmark$$

$$y = \left(\frac{5}{3}\right)^3 + 3\left(\frac{5}{3}\right)^2 + 2\left(\frac{5}{3}\right) - 8$$
$$= \ 2{,}074 \quad \checkmark$$

$$P.O.I.: \left(\frac{5}{3};\ 2{,}074\right)$$

$$\frac{d^2y}{dx^2} = 6x + 10$$

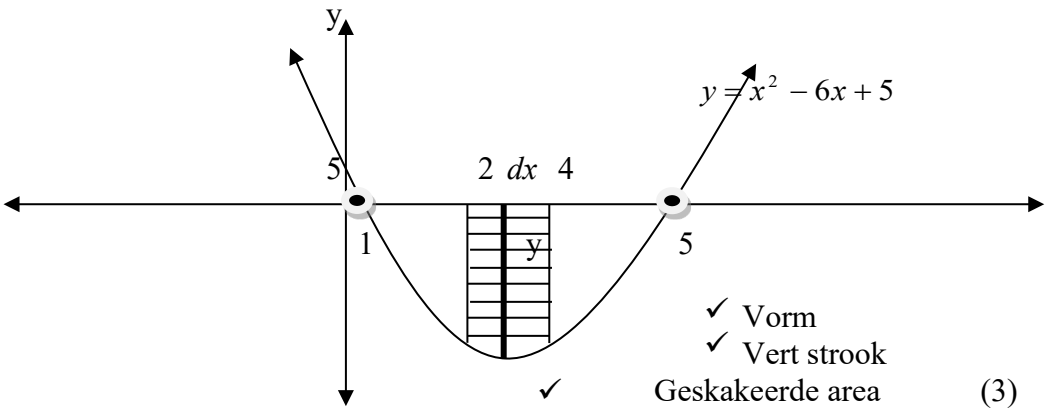
$$At \quad x = \ 0{,}214 : \frac{d^2y}{dx^2} = 6(0{,}214) + 10 = 8{,}71870 \text{ m}$$

$\square(0{,}214;\ 8{,}209)$ minimum $\checkmark$

At $x = \ 3{,}12 : \frac{d^2y}{dx^2} = 6(3{,}12) + 10 = \ 18{,}72 < 0M$

$\square(3{,}12;\ 4{,}061)$ maksimum $\checkmark$ (9)

1.2 1.2.1



✓ Vorm
✓ Vert strook
✓ Geskakeerde area (3)

1.2.2
$$Aox = \int_2^4 \left(x^2 - 6x + 5\right)dx \quad ✓$$
$$= \left[\frac{x^3}{3} - 3x^2 + 5x\right]_2^4 \quad ✓$$
$$= \left[\frac{4^3}{3} - 3(4)^2 + 5(4)\right] - \left[\frac{2^3}{3} - 3(2)^2 + 5(2)\right] \quad ✓$$
$$= -6{,}667 - 0{,}667$$
$$= -7{,}334u^2$$
$$= 7{,}334u^2 \quad ✓$$
(4)

1.3
$$W = \left[50x^2\right]_{0,5}^{1} \quad ✓$$
$$= 50(1)^2 - 50(0{,}5)^2 \quad ✓$$
$$= 37{,}5u \quad ✓$$
(3)
[19]

VRAAG 2

2.1
$$-\frac{2^{-ax}}{9\ln 2} - \frac{1}{2}\cot x - \pi \ln x - \frac{5}{2\sqrt[5]{x^2}} - \sec 15x - \ln yx + c$$
✓ ✓ ✓ ✓ ✓ ✓ ✓
(7)

2.2
$$-2\cot x + \text{cosecx} + c$$
✓ ✓ ✓
(3)

2.3
$$\sqrt{x} + \frac{h}{2\sqrt{x}} - \frac{h^2}{8\sqrt{x^3}}$$
✓ ✓ ✓
(3)

2.4 $$y = \frac{\sin x}{\cos x}$$

Laat $u = \sin x$ en $v = \cos x$

$u^1 = \cos x$ ✓

$v^1 = -\sin x$ ✓

$$\frac{dy}{dx} = \frac{v.u^1 - uv^1}{v^2}$$

$$= \frac{\cos x.\cos x - \sin x(-\sin x)}{(\cos x)^2}$$ ✓

$$= \frac{\cos^2 x + \sin^2 x}{\cos^2 x}$$

$$= \frac{1}{\cos^2 x}$$

$$= \sec^2 x$$ ✓ (4)

2.5 $5{,}3^{5x} \ln 3 + \cos x + \sin x + 0$ ✓ ✓ ✓ ✓ (4)

[21]

VRAAG 3

3.1 $$b + 7 = L.....(1)$$

$$A = L \times b$$

$$500 = (b + 7)b$$

$$b^2 + 7b - 500 = 0.....(2)$$ ✓

$$b = \frac{-7 \pm \sqrt{2049}}{2}$$

$b_1 = 19{,}133 \text{ m}; b_2 = -26{,}133$ (ignoreer)

$L = 19{,}133 \text{ m} + 7 = 26{,}133 \text{ m}$ ✓

Nuwe oppervlak $= l \times b$

$= (19{,}133 \text{ m} + 3 \text{ m}) \times (26{,}133 \text{ m} + 3 \text{ m})$ ✓

$= 644{,}801 \text{ m}^2$ ✓ (5)

3.2
$$e^{\frac{gv}{ct}} = \frac{j}{I} - 1$$
$$\ln\left(e^{\frac{gv}{ct}}\right) = \ln\left(\frac{j}{I} - 1\right) \quad \checkmark$$
$$\frac{gv}{ct} = \ln\left(\frac{j}{I} - 1\right) \quad \checkmark$$
$$g = \frac{ct\ln\left(\frac{j}{I} - 1\right)}{v} \quad \checkmark$$
(3)

3.3
$$(2x+2)\ln 5 = (x-1)\ln 4$$
$$3{,}21887x + 3{,}21887 = 1{,}38629x - 1{,}38629 \quad \checkmark$$
$$1{,}83258x = -4{,}60516$$
$$x = -2{,}513 \quad \checkmark$$
(2)

3.4
$$Z_T = \frac{3 + j4}{(5 - j4) + (2 + j3)}$$
$$= \frac{3 + j4}{7 - j} \times \frac{7 + j}{7 + j} \quad \checkmark$$
$$= \frac{21 + j28 + j3 + j^2 4}{49 - j2} \quad \checkmark$$
$$Z_T = \frac{17}{50} + \frac{j31}{50}$$
$$= 0{,}34 + j0{,}62 \quad \checkmark$$
$$\gamma = \sqrt{(0{,}34)^2 + (0{,}64)^2}$$
$$= \frac{V2}{2} = 0{,}707$$
$$\theta = \tan^{-1}\frac{0{,}62}{0{,}34} = 68{,}067° \quad \checkmark$$
$$Z_T = \frac{\sqrt{2}}{2}\angle 68{,}067° \quad \checkmark$$
(5)

3.5
$$t = \frac{2 \pm \sqrt{-12}}{2} \checkmark$$
$$t = \frac{2 \pm \sqrt{-1}\sqrt{12}}{2} \checkmark$$
$$t = \frac{2 \pm j\sqrt{12}}{2} \checkmark$$
$$t = 1 - \frac{j\sqrt{12}}{2} \; or / of \quad t = 1 + \frac{j\sqrt{12}}{2} \checkmark \quad (4)$$

3.6 $-j3$ ✓ (1)

[20]

VRAAG 4

4.1
$$|D| = \begin{vmatrix} 3 & -5 & 3 \\ 2 & 1 & -7 \\ -10 & 4 & 5 \end{vmatrix} \checkmark$$
$$|D| = 3\begin{vmatrix} 1 & -7 \\ 4 & 5 \end{vmatrix} + 5\begin{vmatrix} 2 & -7 \\ -10 & 5 \end{vmatrix} + 3\begin{vmatrix} 2 & 1 \\ -10 & 4 \end{vmatrix} \checkmark$$
$$= 3(33) + 5(-60) + 3(18)$$
$$= -147 \checkmark$$
$$|DI_3| = \begin{vmatrix} 3 & -5 & 7{,}5 \\ 2 & 1 & -17{,}5 \\ -10 & 4 & 16 \end{vmatrix} \checkmark$$
$$= 3\begin{vmatrix} 1 & -17{,}5 \\ 4 & 16 \end{vmatrix} + 5\begin{vmatrix} 2 & -17{,}5 \\ -10 & 16 \end{vmatrix} + 7{,}5\begin{vmatrix} 2 & 1 \\ -10 & 4 \end{vmatrix} \checkmark$$
$$= 3(86) + 5(-143) + 7{,}5(18)$$
$$= -322 \checkmark$$
$$I_3 = \frac{|DI_3|}{|D|} = \frac{-322}{-147} \checkmark$$
$$I_3 = 2{,}19 \checkmark \quad (8)$$

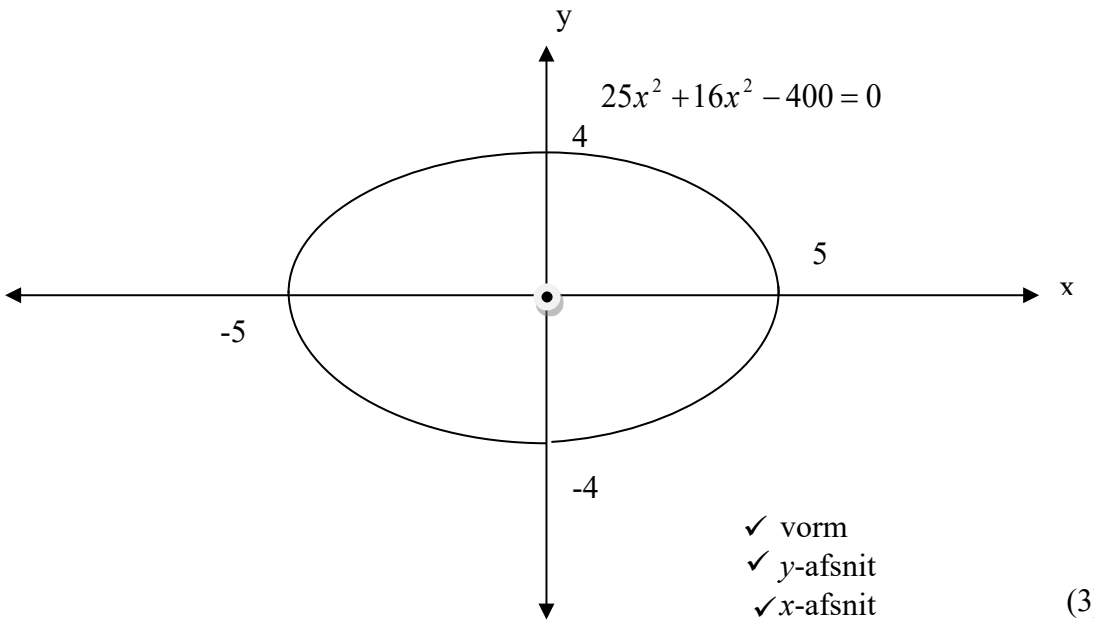
4.2 4.2.1
$$(-)\begin{vmatrix} 1 & 5 \\ -2 & 7 \end{vmatrix} \checkmark$$
$$= -17 \checkmark$$

4.2.2 $\begin{vmatrix} -2 & 3 \\ 6 & -1 \end{vmatrix}$ ✓

$= -16$ ✓

(2 × 2) (4)

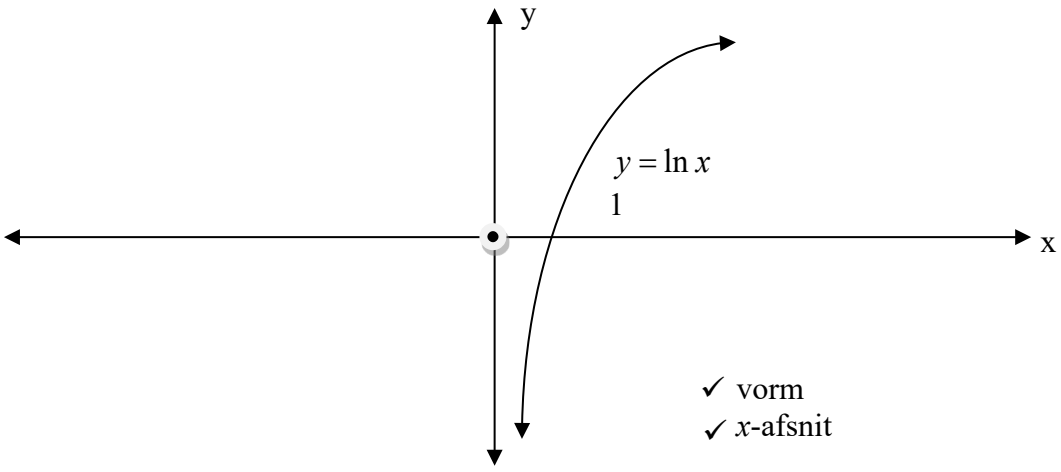
4.3 4.3.1



✓ vorm
✓ *y*-afsnit
✓*x*-afsnit (3)

4.3.2 x of y-as✓ (1)

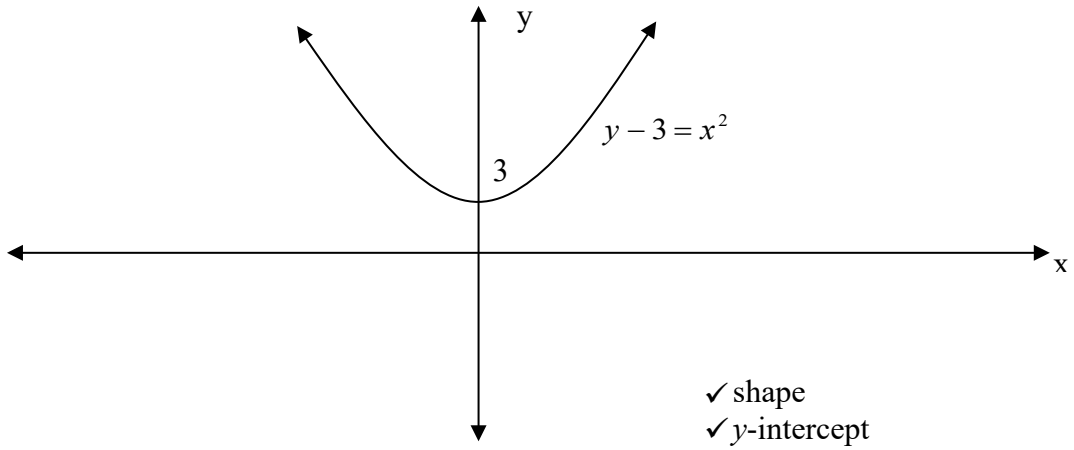
4.4



✓ vorm
✓ *x*-afsnit

(2)

4.5



✓shape
✓y-intercept (2)

[20]

VRAAG 5

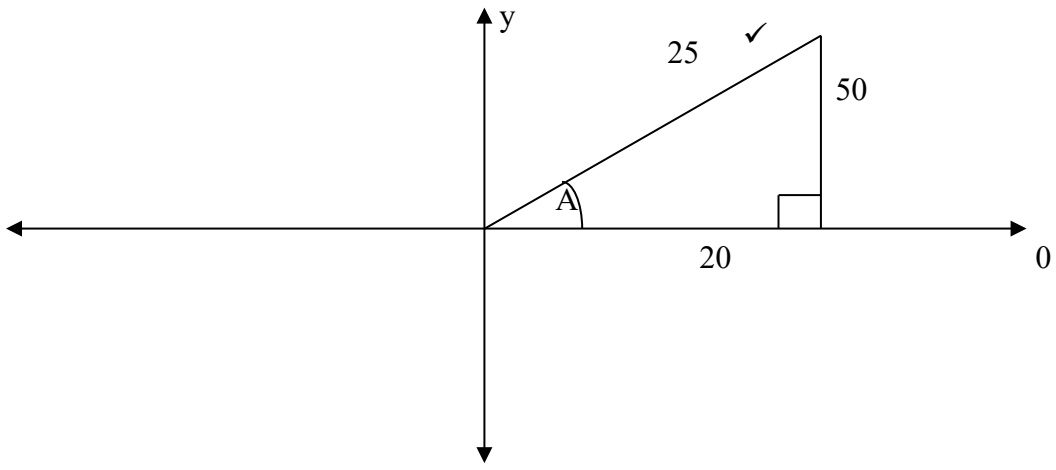
5.1
$$\text{cosec}(2\theta-70°)=\text{cosec}\left[90°-\left(\frac{\theta}{2}+10°\right)\right] \quad ✓$$
$$\text{cosec}(2\theta-70°)=\text{cosec}\left(80°-\frac{\theta}{2}\right) \quad ✓$$
$$2\theta-75°=80°-\frac{\theta}{2}$$
$$\theta=60° \quad ✓ \qquad (3)$$

5.2
$$RHS=\frac{1-\tan^2 x}{\sqrt{(1+\tan^2 x)}} \quad ✓$$
$$=\frac{1-\tan^2 x}{1+\tan^2 x}$$
$$=\frac{1-\tan^2 x}{\sec^2 x}$$
$$=\frac{1}{\sec^2 x}-\frac{\tan^2 x}{\sec^2 x} \quad ✓$$
$$=\cos^2 x-\sin^2 x \quad ✓$$
$$=\cos 2x \quad ✓$$
$$LHS=RHS \quad ✓ \qquad (6)$$

5.3
$$\frac{1-\left(1-2\sin^2 x\right)}{\tan x} \checkmark$$
$$\frac{2\sin^2 x}{\tan x} \checkmark$$
$$\frac{2\sin^2 x}{1}$$
$$\frac{\sin x}{\cos x}$$
$$2\sin x\cos x \checkmark$$
$$\sin 2x \checkmark$$
(4)

5.4
$$\frac{-\tan\theta.-\cos\theta.\left(\frac{1}{\sin\theta}\right)}{-\sin\theta.\tan\theta.-\cos\theta}$$
$$=\frac{-1}{\sin\theta}.\frac{-1}{\sin\theta} \checkmark$$
$$=\frac{1}{\sin^2\theta} \checkmark$$
$$=\text{cosec}^2\theta \checkmark$$
(3)

5.5



$$\cos\frac{A}{2}=\frac{\frac{20}{25}}{2} \checkmark$$
$$=\frac{10}{25} \checkmark$$
(4)
[20]

TOTAAL: 100

Kopiereg voorbehou