higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NASIENRIGLYN

NASIONALE SERTIFIKAAT

WISKUNDE N4

25 JULIE 2018

Hierdie nasienriglyn bestaan uit 9 bladsye.

Kopiereg voorbehou

VRAAG 1

1.1 $$\frac{\sin(180°+30°).\tan(180°+45°).\cos(360°-45°)}{\sin(-45°).\cos(180°+60°)}$$

$$\frac{(-\sin 30°).(\tan 45°).\cos(45°)}{(-\sin 45°).(-\cos 60°)} \quad \surd$$

$$\frac{\frac{-1}{2}.1.\frac{1}{\sqrt{2}}}{\frac{-1}{\sqrt{2}}.\frac{-1}{2}} \quad \checkmark$$

$$-1 \quad \checkmark$$

(3)

1.2 $$2(1-2\sin^2 c)+3\sin c-1=0 \quad \checkmark$$

$$4\sin^2 c-3\sin c-1=0$$

$$(4\sin c+1)(\sin c-1)=0 \quad \checkmark$$

$$\sin c=\frac{-1}{4} \; or/of \quad \sin c-1$$

$$c_1=90° \quad \checkmark$$

$$c_2=180°+\arcsin 0{,}25$$

$$c_2=194{,}478° \quad \checkmark$$

$$c_3=360°-\arcsin 0{,}25$$

$$c_3=345{,}522° \quad \checkmark$$

(5)

1.3 1.3.1 $$\sin^2\frac{x}{2}=\frac{1-\cos x}{2} \quad \checkmark$$

$$\sin\frac{x}{2}=\pm\sqrt{\frac{1-\cos x}{2}} \quad \checkmark$$

(2)

1.3.2 $$\sin 15°=\sin\frac{30°}{2}=\pm\sqrt{\frac{1-\cos 30°}{2}} \quad \checkmark$$

$$=\pm\sqrt{\frac{1-\frac{\sqrt{3}}{2}}{2}}$$

$$=\pm\sqrt{\frac{\sqrt{3}-1}{4}} \quad \checkmark$$

$$\sin 15°=\pm\frac{\sqrt{\sqrt{3}-1}}{2} \quad \checkmark$$

(3)

1.4 $2-\sec^2 y = \cos 2y(\tan^2 y + 1)$

$RHS = (2\cos^2 - 1)\sec^2 y$ ✓

$= 2\cos^2 y \sec^2 y - \sec^2 y$ ✓

$RHS = 2 - \sec^2 y$ ✓

$LHS = RHS$ ✓

(4)

1.5 $(\cos 15°)^2 = [\cos(60° - 45°)]^2$

$= (\cos 60° \cos 45° + \sin 60° \sin 45°)^2$

$= \left(\frac{1}{2}.\frac{1}{\sqrt{2}} + \frac{\sqrt{3}}{2}.\frac{1}{\sqrt{2}}\right)^2$ ✓

$= \left(\frac{1+\sqrt{3}}{2\sqrt{2}}\right)$ ✓

$= \frac{2+\sqrt{3}}{4}$ ✓

(3)

[20]

VRAAG 2

2.1 2.1.1

$Aox = \int_0^{\pi/2} 3\sin x dx$ ✓

$= [-3\cos x]_0^{\pi/2}$ ✓

$= -3\cos \pi/2 - (-\cos 0)$ ✓

$= 0 + 3$

$= 3u^2$ ✓

(4)

2.1.2 $\frac{dy}{dx} = 3\cos x$ ✓

$0 = 3\cos x$ ✓

$x_1 = 90°; x_2 = 360° - 90° = 270°$ ✓

$y_1 = 3\sin 90°; y_2 = 3\sin 270°$ ✓

$= 3 \qquad = -3$ ✓

$TP_s : (90°,3); (270°,3)$ ✓

(6)

2.1.3 $\frac{d^2y}{dx^2} = -3\sin x$ ✓

$for \quad x = 90° : \frac{d^2y}{dx^2} = -3\sin 90° = -3, < 0 Max = (90°, 3)$ ✓

$for \quad x = 270° : \frac{d^2y}{dx^2} = -3\sin 270° = 3 > 0 Min = (270°, -3)$ ✓

(3)

2.2 $\frac{-4}{3}e^{3x}$ ✓ $-2\cos x$ ✓ $+\sec x$ ✓ $-\frac{2\sqrt{5}}{3}\sqrt{x^3}$ ✓ $+5x$ ✓ $+\frac{2^{-3x}}{In3}$ ✓ $+c$ ✓

(7)

[20]

VRAAG 3

3.1 $Let \quad u = x^5 - 7x \quad and / en \quad y = \tan u$

$\frac{du}{dx} = 5x^4 - 7$ ✓ $\frac{dy}{du} = \sec^2 u$ ✓

$\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$

$= \sec^2 u \times (5x^4 - 7)$ ✓

$\frac{dy}{dx} = (5x^4 - 7)\sec^2(x^5 - 7x)$ ✓

(4)

3.2 $\frac{dx}{dy} = \frac{-3}{5\sqrt[5]{y^6}}$ ✓ $+3\pi\sin 3\pi y$ ✓ $+22e^{-22y}$ ✓ $-\frac{6}{y}$ ✓

(4)

3.3 $\lim_{x \to \infty}\left(\frac{\frac{2x^2}{x^2} - \frac{8}{x^2}}{\frac{x^2}{x^2} + \frac{2}{x^2}}\right)$ ✓

$\lim_{x \to \infty}\left(\frac{2 - \frac{8}{x^2}}{1 - \frac{2}{x^2}}\right)$ ✓

$= \frac{2 - \frac{8}{(\infty)^2}}{1 - \frac{2}{(\infty)^2}}$

$= 2$ ✓

(3)

3.4

$$f(x) = -x^3$$
$$f(x+h) = -(x+h)^3 = -\left[x^3 + 3x^2h + 3xh^2 + h^3\right] \checkmark$$
$$f(x+h) - f(x) = -x^3 - 3x^2h - 3xh^2 - h^3 - \left(-x^3\right)$$
$$= -3x^2h - 3xh^2 - h^3 \checkmark$$
$$\frac{f(x+h) - f(x)}{h} = \frac{-3x^2h - 3xh^2 - h^3}{h} = -3x^2 - 3xh - h^2 \checkmark$$
$$\lim_{h \to 0}\left[\frac{f(x+h) - f(x)}{h}\right] = -3x^2 - 3x(0) - (0)^2$$
$$= -3x^2 \checkmark$$

(4)

3.5

$$= \left[\frac{t^4}{4} + \frac{t^2}{2}\right]_0^4 \checkmark$$
$$= \left[\frac{4^4}{4} + \frac{4^2}{2}\right] \checkmark$$
$$= 64 + 8$$
$$= 72 \checkmark$$

(3)

3.6

$$\int \sec x . \tan x dx \checkmark$$
$$= \sec x + c \checkmark$$

(2)

[20]

VRAAG 4

4.1

$$1.8x + j3.4y = \frac{7 + j5}{2 - j} \times \frac{2 + j}{2 + j} \checkmark$$
$$= \frac{9 + j17}{5}$$
$$1.8x = \frac{9}{5} .....(1)$$
$$3.4y = \frac{17}{5} .....(2) \checkmark$$
$$x = \frac{\frac{9}{5}}{1.8} = 1 \checkmark$$
$$y = \frac{\frac{17}{5}}{3.4} = 1 \checkmark$$

(4)

4.2 $\left(\sqrt{17}\,\underline{|195,596°}\right)^5$ ✓

$1191,5775\,\underline{|977,98°}$ ✓

$1191,578\left(\cos 977,98° + j\sin 977,98°\right)$ ✓ ✓

$-1121,005 - j403,9847$ (4)

4.3 $z = \dfrac{10\,\underline{|-15°}}{12\,\underline{|12°}}$ ✓

$\gamma = \dfrac{10}{12}$ ✓

$\theta = -27°$ ✓ (3)

4.4 $|D| = \begin{vmatrix} 7 & -6 \\ 3 & 4 \end{vmatrix}$

$= 7(4) - (-6)3$

$|D| = 46$ ✓

$|Da| = \begin{vmatrix} 27 & -6 \\ 5 & 4 \end{vmatrix}$

$|Da| = 138$ ✓

$|Db| = \begin{vmatrix} 7 & 27 \\ 3 & 5 \end{vmatrix}$

$|Db| = -46$ ✓

$a = \dfrac{|Da|}{|D|} = \dfrac{138}{46}$

$a = 3$ ✓

$b = \dfrac{|Db|}{|D|} = \dfrac{-46}{46}$

$b = -1$ ✓ (5)

4.5 4.5.1

$$|D| = 0\begin{vmatrix} -1 & 0 \\ 0 & \frac{-1}{3} \end{vmatrix} + \frac{1}{2}\begin{vmatrix} \frac{1}{2} & \frac{1}{3} \\ 0 & \frac{-1}{3} \end{vmatrix} - (-3)\begin{vmatrix} \frac{1}{2} & \frac{1}{3} \\ -1 & 0 \end{vmatrix} \checkmark$$

$$= 0 + \frac{1}{2}\left(\frac{-1}{6}\right) + 3\left(\frac{1}{3}\right) \checkmark$$

$$= \frac{-1}{12} + 1$$

$$= 0{,}916 \checkmark$$

(3)

4.5.2

$$(-)\begin{vmatrix} 0 & \frac{1}{3} \\ -3 & \frac{-1}{3} \end{vmatrix}$$

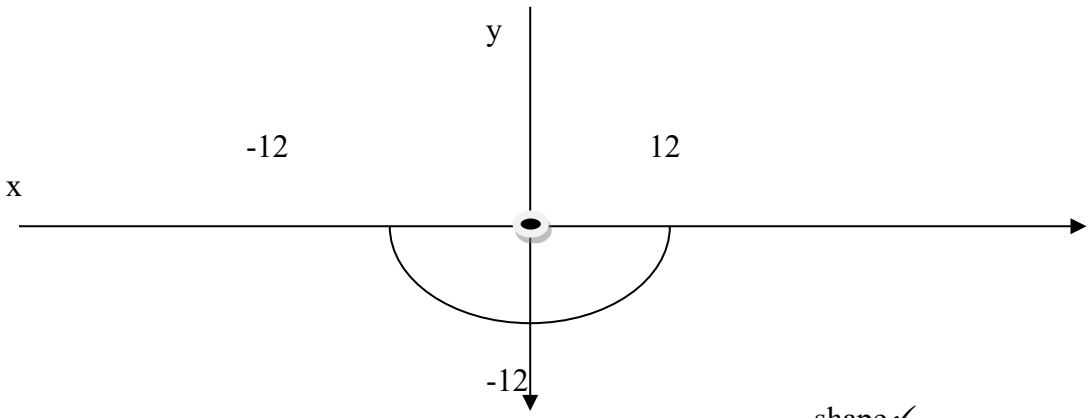
$$= -1 \checkmark$$

(1)

[20]

VRAAG 5

5.1 5.1.1



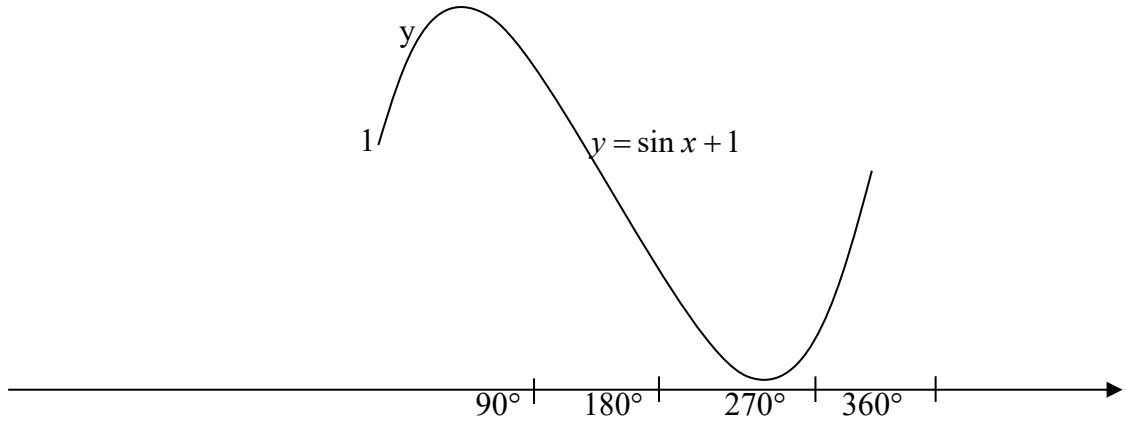
shape ✓
-12 ✓

(2)

5.1.2 $Gebied = \{x : -12 \le x \le 12, xER\}$
$Strek = \{y : -12 \le 12, yER\}$ ✓ (1)

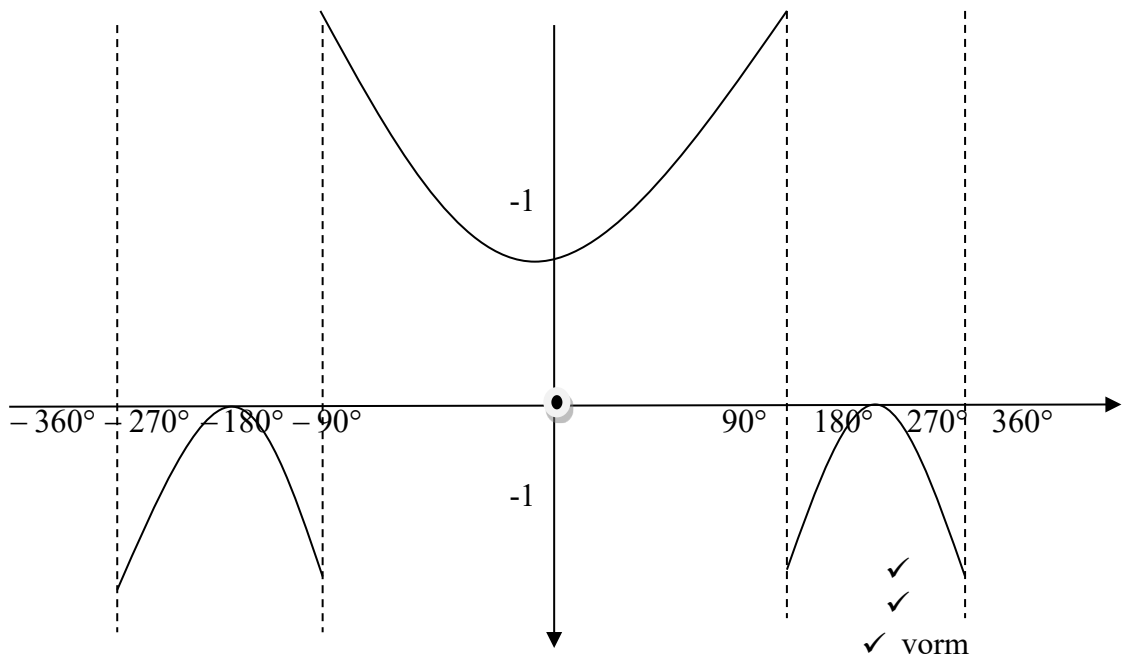
5.1.3 $x = -\sqrt{144 - y^2}$ ✓ (1)

5.2



Vorm ✓
$y = 1$ ✓
$x = 270°$ ✓ (3)

5.3



(3)

5.4 $\dfrac{1-y}{1-y^2} = \dfrac{R5}{R1}$

$1 - y^n = \dfrac{R1}{R5}(1-y)$ ✓

$y^n = 1 - \dfrac{R1}{R5}(1-y)$ ✓

$n \ln y = \ln\left[1 - \dfrac{R1}{R5}(1-y)\right]$ ✓

$n = \dfrac{\ln\left[1 - \dfrac{R1}{R5}(1-y)\right]}{\ln y}$ ✓

(4)

5.5 $\left[8(a-1)-(a+1)\right]\left[64(a-1)^2+8(a-1)(a+1)+(a+1)^2\right]$ ✓ ✓ ✓ (3)

5.6 $(3y+2)\ln 15=(8+y)\ln 2$ ✓

$8{,}124y+5{,}416=5{,}5452+0{,}69314y$ ✓

$7{,}43ly=0{,}1292$

$y=0{,}0174$ ✓

(3)
[20]

TOTAAL: 100

Kopiereg voorbehou