



**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.

VRAAG 1

$$\begin{aligned}
 1.1 \quad & \frac{\sin(180^\circ + 30^\circ) \cdot \tan(180^\circ + 45^\circ) \cdot \cos(360^\circ - 45^\circ)}{\sin(-45^\circ) \cdot \cos(180^\circ + 60^\circ)} \\
 & \frac{(-\sin 30^\circ)(\tan 45^\circ) \cdot \cos(45^\circ)}{(-\sin 45^\circ)(-\cos 60^\circ)} \quad \checkmark \\
 & \frac{-\frac{1}{2} \cdot 1 \cdot \frac{1}{\sqrt{2}}}{\frac{-1}{\sqrt{2}} \cdot \frac{-1}{2}} \quad \checkmark \\
 & -1 \quad \checkmark
 \end{aligned}
 \tag{3}$$

$$\begin{aligned}
 1.2 \quad & 2(1 - 2\sin^2 c) + 3\sin c - 1 = 0 \\
 & 4\sin^2 c - 3\sin c - 1 = 0 \\
 & (4\sin c + 1)(\sin c - 1) = 0 \quad \checkmark \\
 & \sin c = \frac{-1}{4} \text{ or / of } \sin c - 1 \\
 & c_1 = 90^\circ \quad \checkmark \\
 & c_2 = 180^\circ + \arcsin 0,25 \\
 & c_2 = 194,478^\circ \quad \checkmark \\
 & c_3 = 360^\circ - \arcsin 0,25 \\
 & c_3 = 345,522^\circ \quad \checkmark
 \end{aligned}
 \tag{5}$$

$$\begin{aligned}
 1.3 \quad 1.3.1 \quad & \sin^2 \frac{x}{2} = \frac{1 - \cos x}{2} \quad \checkmark \\
 & \sin \frac{x}{2} = \pm \sqrt{\frac{1 - \cos x}{2}} \quad \checkmark
 \end{aligned}
 \tag{2}$$

$$\begin{aligned}
 1.3.2 \quad & \sin 15^\circ = \sin \frac{30^\circ}{2} = \pm \sqrt{\frac{1 - \cos 30^\circ}{2}} \quad \checkmark \\
 & = \pm \sqrt{\frac{1 - \frac{\sqrt{3}}{2}}{2}} \\
 & = \pm \sqrt{\frac{\sqrt{3} - 1}{4}} \quad \checkmark \\
 & \sin 15^\circ = \pm \frac{\sqrt{\sqrt{3} - 1}}{2} \quad \checkmark
 \end{aligned}
 \tag{3}$$

$$\begin{aligned}
 1.4 \quad 2 - \sec^2 y &= \cos 2y (\tan^2 y + 1) \\
 RHS &= (2 \cos^2 y - 1) \sec^2 y \quad \checkmark \\
 &= 2 \cos^2 y \sec^2 y - \sec^2 y \quad \checkmark \\
 RHS &= 2 - \sec^2 y \quad \checkmark \\
 LHS &= RHS \quad \checkmark
 \end{aligned}
 \tag{4}$$

$$\begin{aligned}
 1.5 \quad (\cos 15^\circ)^2 &= [\cos(60^\circ - 45^\circ)]^2 \\
 &= (\cos 60^\circ \cos 45^\circ + \sin 60^\circ \sin 45^\circ)^2 \\
 &= \left(\frac{1}{2} \cdot \frac{1}{\sqrt{2}} + \frac{\sqrt{3}}{2} \cdot \frac{1}{\sqrt{2}} \right)^2 \quad \checkmark \\
 &= \left(\frac{1 + \sqrt{3}}{2\sqrt{2}} \right)^2 \quad \checkmark \\
 &= \frac{2 + \sqrt{3}}{4} \quad \checkmark
 \end{aligned}
 \tag{3}$$

[20]

VRAAG 2

$$\begin{aligned}
 2.1 \quad 2.1.1 \quad Aox &= \int_0^{\pi/2} 3 \sin x dx \quad \checkmark \\
 &= [-3 \cos x]_0^{\pi/2} \quad \checkmark \\
 &= -3 \cos \frac{\pi}{2} - (-\cos 0) \quad \checkmark \\
 &= 0 + 3 \\
 &= 3u^2 \quad \checkmark
 \end{aligned}
 \tag{4}$$

$$\begin{aligned}
 2.1.2 \quad \frac{dy}{dx} &= 3 \cos x \quad \checkmark \\
 0 &= 3 \cos x \quad \checkmark \\
 x_1 &= 90^\circ; x_2 = 360^\circ - 90^\circ = 270^\circ \quad \checkmark \\
 y_1 &= 3 \sin 90^\circ; y_2 = 3 \sin 270^\circ \quad \checkmark \\
 &= 3 \quad \quad \quad = -3 \quad \checkmark \\
 TP_s &: (90^\circ, 3); (270^\circ, -3) \quad \checkmark
 \end{aligned}
 \tag{6}$$

$$\begin{aligned}
 2.1.3 \quad \frac{d^2 y}{dx^2} &= -3 \sin x \quad \checkmark \\
 \text{for } x = 90^\circ: \frac{d^2 y}{dx^2} &= -3 \sin 90^\circ = -3, < 0 \text{ Max} = (90^\circ, 3) \quad \checkmark \\
 \text{for } x = 270^\circ: \frac{d^2 y}{dx^2} &= -3 \sin 270^\circ = 3 > 0 \text{ Min} = (270^\circ, -3) \quad \checkmark
 \end{aligned}
 \tag{3}$$

$$2.2 \quad \frac{-4}{3} e^{3x} - 2 \cos x + \sec x - \frac{2\sqrt{5}}{3} \sqrt{x^3} + 5x + \frac{2^{-3x}}{\ln 3} + c \quad \checkmark \quad \checkmark \quad \checkmark \quad \checkmark \quad \checkmark \quad \checkmark \quad \checkmark$$

(7)
[20]

VRAAG 3

$$\begin{aligned}
 3.1 \quad \text{Let } u &= x^5 - 7x \quad \text{and / en } y = \tan u \\
 \frac{du}{dx} &= 5x^4 - 7 \quad \checkmark \quad \frac{dy}{du} = \sec^2 u \quad \checkmark \\
 \frac{dy}{dx} &= \frac{dy}{du} \times \frac{du}{dx} \\
 &= \sec^2 u \times (5x^4 - 7) \quad \checkmark \\
 \frac{dy}{dx} &= (5x^4 - 7) \sec^2 (x^5 - 7x) \quad \checkmark
 \end{aligned}
 \tag{4}$$

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

(4)

$$\begin{aligned}
 3.3 \quad \lim_{x \rightarrow \infty} \left(\frac{\frac{2x^2}{x^2} - \frac{8}{x^2}}{\frac{x^2}{x^2} + \frac{2}{x^2}} \right) &\quad \checkmark \\
 \lim_{x \rightarrow \infty} \left(\frac{2 - \frac{8}{x^2}}{1 - \frac{2}{x^2}} \right) &\quad \checkmark \\
 &= \frac{2 - \frac{8}{(\infty)^2}}{1 - \frac{2}{(\infty)^2}} \\
 &= 2 \quad \checkmark
 \end{aligned}
 \tag{3}$$

$$\begin{aligned}
 3.4 \quad f(x) &= -x^3 \\
 f(x+h) &= -(x+h)^3 = -[x^3 + 3x^2h + 3xh^2 + h^3] \quad \checkmark \\
 f(x+h) - f(x) &= -x^3 - 3x^2h - 3xh^2 - h^3 - (-x^3) \\
 &= -3x^2h - 3xh^2 - h^3 \quad \checkmark \\
 \frac{f(x+h) - f(x)}{h} &= \frac{-3x^2h - 3xh^2 - h^3}{h} = -3x^2 - 3xh - h^2 \quad \checkmark \\
 \lim_{h \rightarrow 0} \left[\frac{f(x+h) - f(x)}{h} \right] &= -3x^2 - 3x(0) - (0)^2 \\
 &= -3x^2 \quad \checkmark
 \end{aligned} \tag{4}$$

$$\begin{aligned}
 3.5 \quad &= \left[\frac{t^4}{4} + \frac{t^2}{2} \right]_0^4 \quad \checkmark \\
 &= \left[\frac{4^4}{4} + \frac{4^2}{2} \right] \quad \checkmark \\
 &= 64 + 8 \\
 &= 72 \quad \checkmark
 \end{aligned} \tag{3}$$

$$\begin{aligned}
 3.6 \quad \int \sec x \cdot \tan x \, dx &\quad \checkmark \\
 &= \sec x + c \quad \checkmark
 \end{aligned} \tag{2}$$

[20]

VRAAG 4

$$\begin{aligned}
 4.1 \quad 1.8x + j3.4y &= \frac{7+j5}{2-j} \times \frac{2+j}{2+j} \quad \checkmark \\
 &= \frac{9+j17}{5} \\
 1.8x &= \frac{9}{5} \dots\dots\dots(1) \\
 3.4y &= \frac{17}{5} \dots\dots\dots(2) \quad \checkmark \\
 x &= \frac{\frac{9}{5}}{1.8} = 1 \quad \checkmark \\
 y &= \frac{\frac{17}{5}}{3.4} = 1 \quad \checkmark
 \end{aligned} \tag{4}$$

$$\begin{aligned}
 4.2 \quad & \left(\sqrt{17} |195,596^\circ| \right)^5 \checkmark \\
 & 1191,5775 |977,98^\circ| \checkmark \\
 & 1191,578 (\cos 977,98^\circ + j \sin 977,98^\circ) \checkmark \\
 & -1121,005 - j403,9847 \quad (4)
 \end{aligned}$$

$$\begin{aligned}
 4.3 \quad & z = \frac{10 | -15^\circ |}{12 | 12^\circ |} \checkmark \\
 & \gamma = \frac{10}{12} \checkmark \\
 & \theta = -27^\circ \checkmark \quad (3)
 \end{aligned}$$

$$\begin{aligned}
 4.4 \quad & |D| = \begin{vmatrix} 7 & -6 \\ 3 & 4 \end{vmatrix} \\
 & = 7(4) - (-6)3 \\
 & |D| = 46 \checkmark \\
 & |Da| = \begin{vmatrix} 27 & -6 \\ 5 & 4 \end{vmatrix} \\
 & |Da| = 138 \checkmark \\
 & |Db| = \begin{vmatrix} 7 & 27 \\ 3 & 5 \end{vmatrix} \\
 & |Db| = -46 \checkmark \\
 & a = \frac{|Da|}{|D|} = \frac{138}{46} \\
 & a = 3 \checkmark \\
 & b = \frac{|Db|}{|D|} = \frac{-46}{46} \\
 & b = -1 \checkmark \quad (5)
 \end{aligned}$$

4.5 4.5.1

$$\begin{aligned}
 |D| &= 0 \begin{vmatrix} -1 & 0 \\ 0 & -\frac{1}{3} \end{vmatrix} + \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{3} \\ 0 & -\frac{1}{3} \end{vmatrix} - (-3) \begin{vmatrix} \frac{1}{2} & \frac{1}{3} \\ -1 & 0 \end{vmatrix} \\
 &= 0 + \frac{1}{2} \left(\frac{-1}{6} \right) + 3 \left(\frac{1}{3} \right) \\
 &= \frac{-1}{12} + 1 \\
 &= 0,916 \quad \checkmark
 \end{aligned}
 \tag{3}$$

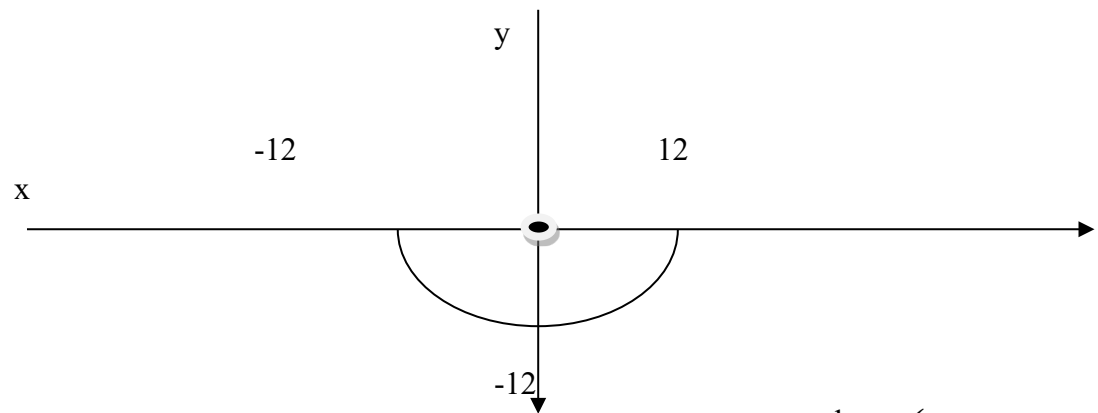
4.5.2

$$\begin{aligned}
 &(-) \begin{vmatrix} 0 & \frac{1}{3} \\ -3 & -\frac{1}{3} \end{vmatrix} \\
 &= -1 \quad \checkmark
 \end{aligned}
 \tag{1}$$

[20]

VRAAG 5

5.1 5.1.1



shape $\checkmark$
-12 $\checkmark$

(2)

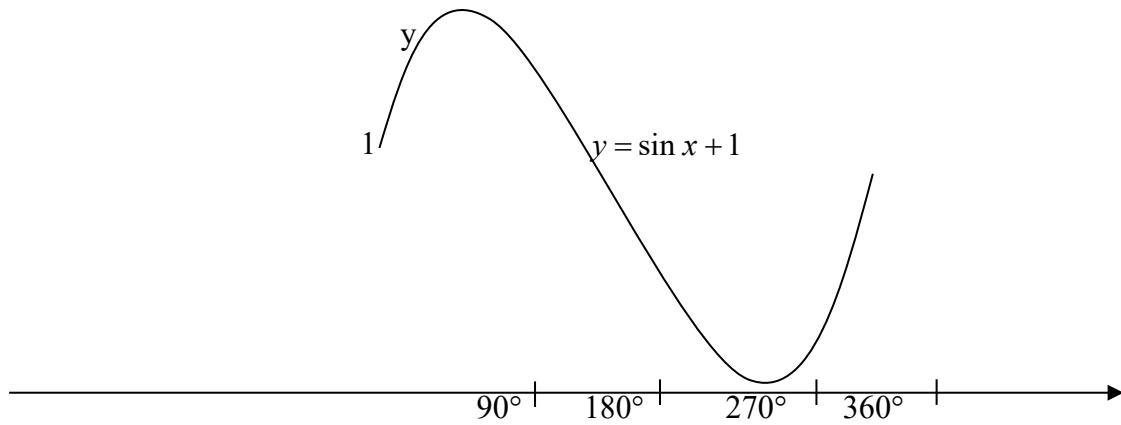
$$\begin{aligned}
 \text{Gebied} &= \{x : -12 \leq x \leq 12, x \in \mathbb{R}\} \\
 \text{Strek} &= \{y : -12 \leq y \leq 12, y \in \mathbb{R}\} \quad \checkmark
 \end{aligned}$$

(1)

$$x = -\sqrt{144 - y^2} \quad \checkmark$$

(1)

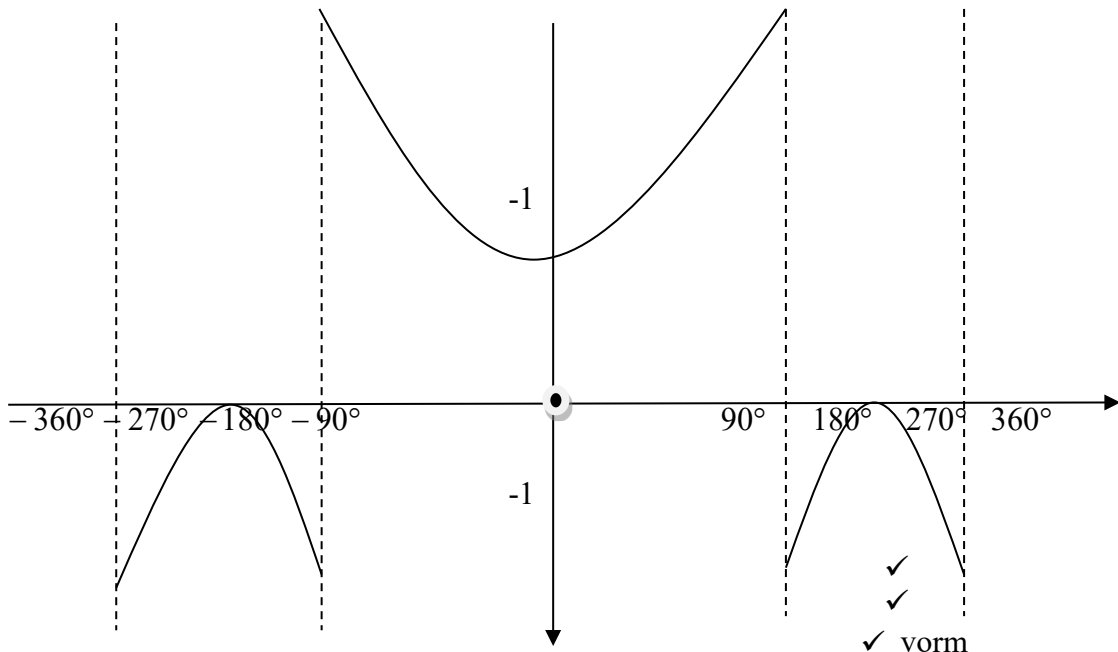
5.2



Vorm ✓
 $y = 1$ ✓
 $x = 270^\circ$ ✓

(3)

5.3



✓
 ✓
 ✓ vorm

(3)

5.4

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

$$1-y^n = \frac{R1}{R5}(1-y) \quad \checkmark$$

$$y^n = 1 - \frac{R1}{R5}(1-y) \quad \checkmark$$

$$n \ln y = \ln \left[1 - \frac{R1}{R5}(1-y) \right] \quad \checkmark$$

$$n = \frac{\ln \left[1 - \frac{R1}{R5}(1-y) \right]}{\ln y} \quad \checkmark$$

(4)

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

$$5.6 \quad (3y+2)\ln 15 = (8+y)\ln 2 \quad \checkmark$$

$$8,124y + 5,416 = 5,5452 + 0,69314y \quad \checkmark$$

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

$$y = 0,0174 \quad \checkmark$$

(3)
[20]**TOTAAL: 100**