



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NASIENRIGLYN

NASIONALE SERTIFIKAAT

WISKUNDE N4

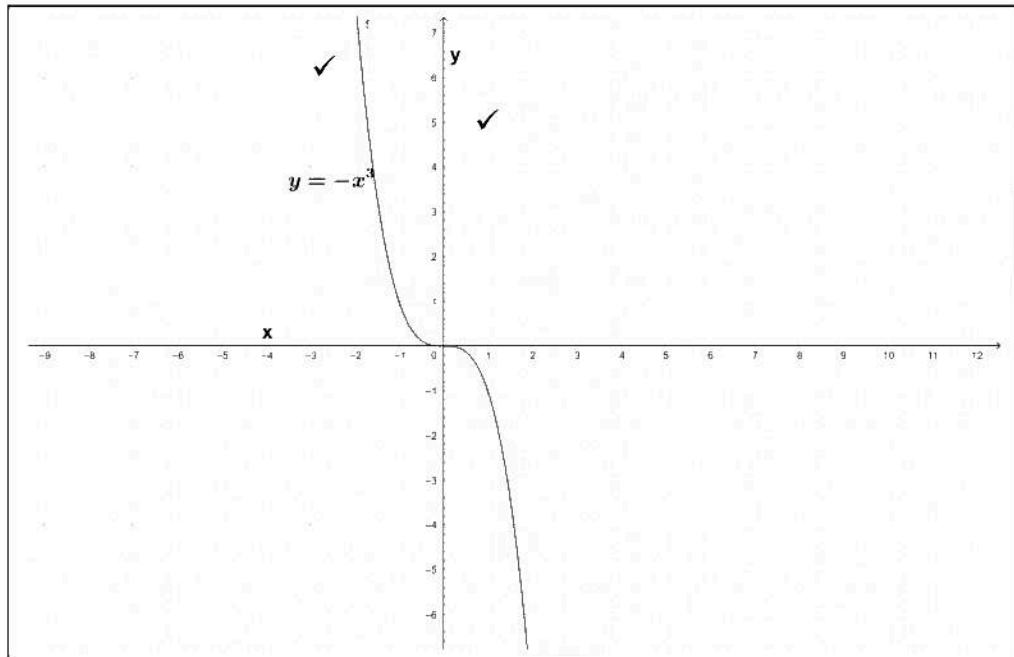
29 Julie 2024

Hierdie nasienriglyn bestaan uit 8 bladsye.

VRAAG 1

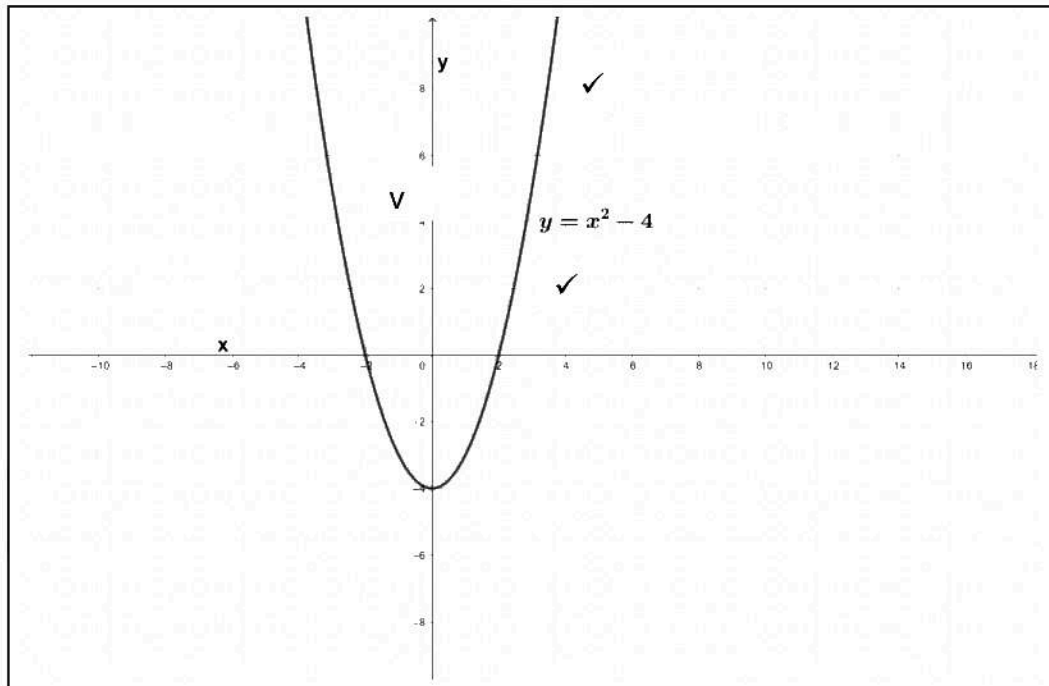
1.1

✓



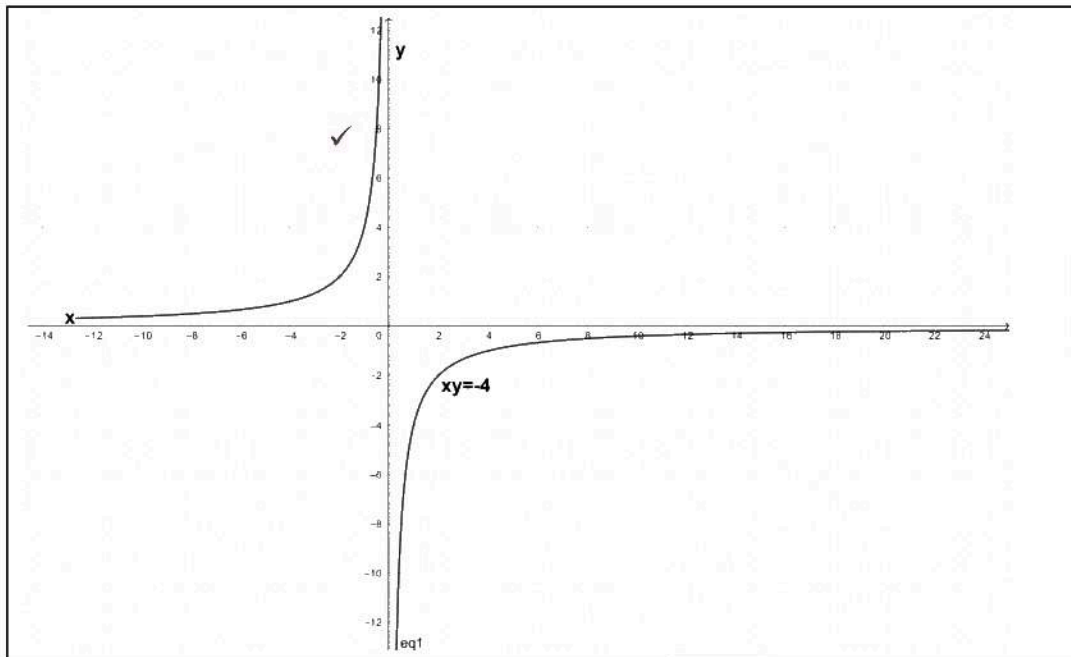
(3)

1.2



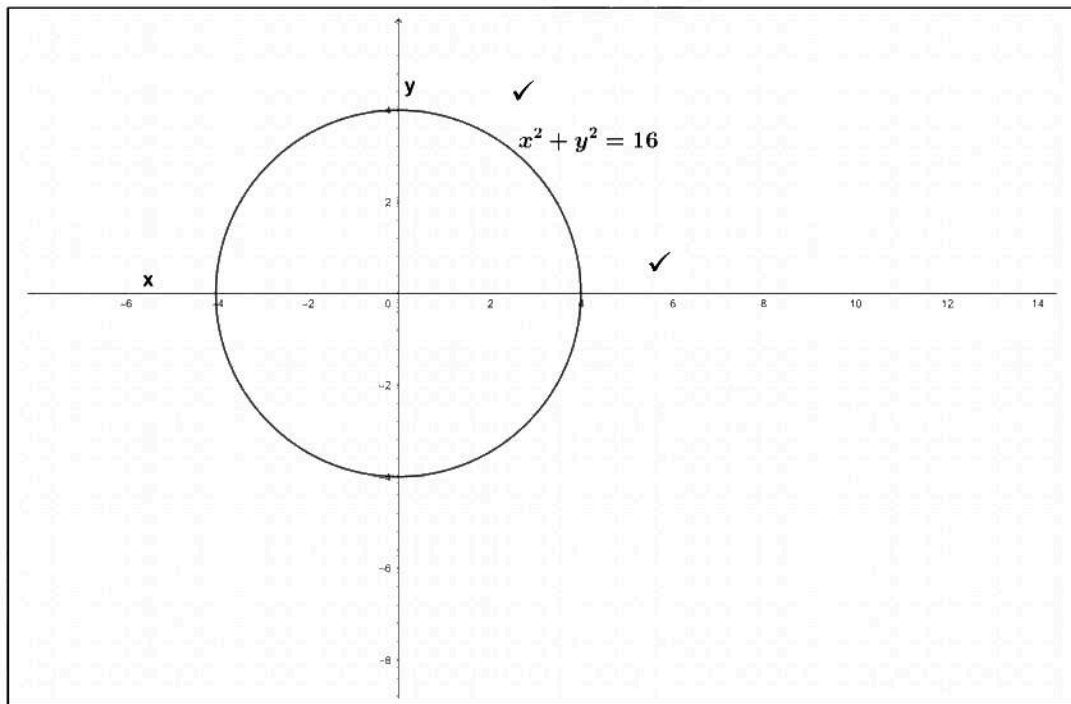
(3)

1.3



(2)

1.4



(2)
[10]

VRAAG 2

$$\begin{aligned} 2.1 \quad 2.1.1 \quad (|r|) &= \sqrt{x^2 + y^2} \\ &= \sqrt{2^2 + -3^2} \\ &= \sqrt{13} \end{aligned}$$

$$\tan \theta = \frac{2}{3}$$

$$\begin{aligned} \theta &= \tan^{-1} \left(\frac{2}{3} \right) \checkmark \\ &= 33,7^\circ \checkmark \end{aligned}$$

$$\begin{aligned} \therefore \theta &= 360^\circ - 33,7^\circ \\ &= 326,3^\circ \checkmark \end{aligned}$$

$$\begin{aligned} &(13 \angle 326,3^\circ)^4 \\ &= 169 \angle 1214,7^\circ \checkmark \end{aligned}$$

(4)

$$\begin{aligned} 2.1.2 \quad &= \frac{(2+i)(-4+i)}{3-2i} \\ &= \frac{-8+4i-4i+2i^2}{3-2i} \checkmark \\ &= \frac{-10}{3-2i} \times \frac{3+2i}{3+2i} \checkmark \\ &= \frac{-30-20i}{9+6i-6i-4i^2} \checkmark \\ &= -\frac{30}{13} - \frac{20i}{13} \checkmark \end{aligned}$$

(4)

$$\begin{aligned} 2.1.3 \quad &= \frac{3(j^2)^2 j - (j^2)^8}{1-2j} \\ &= \frac{3j-1}{1-2j} \times \frac{1+2j}{1+2j} \checkmark \\ &= \frac{3j+6j^2-1-2j}{1+2j-2j+4j^2} \checkmark \\ &= \frac{j-7}{-3} \checkmark \checkmark \end{aligned}$$

(4)

$$\begin{aligned}
 2.2 \quad \Delta_0 &= \begin{vmatrix} 2 & 3 \\ 4 & -2 \end{vmatrix} \\
 &= -4 - 12 = -16 \\
 \Delta_x &= \begin{vmatrix} 4 & 3 \\ 12 & -2 \end{vmatrix} \checkmark \\
 &= 8 - 36 = -44 \checkmark \\
 \Delta_y &= \begin{vmatrix} 2 & 4 \\ 4 & 12 \end{vmatrix} \\
 &= 24 - 16 = 8 \\
 x &= \frac{\Delta_x}{\Delta_0} = \frac{-44}{-16} = 2,75 \checkmark \\
 y &= \frac{\Delta_y}{\Delta_0} = \frac{8}{-16} = -\frac{1}{2} \checkmark
 \end{aligned} \tag{4}$$

$$\begin{aligned}
 2.3 \quad &\begin{vmatrix} 2 & 3 & 4 \\ 5 & -1 & -3 \\ -4 & -2 & -5 \end{vmatrix} \\
 \Delta_0 &= 2 \begin{vmatrix} -1 & -3 \\ -2 & -5 \end{vmatrix} - 5 \begin{vmatrix} 3 & 4 \\ -2 & -5 \end{vmatrix} - 4 \begin{vmatrix} 3 & 4 \\ -1 & -3 \end{vmatrix} \checkmark \checkmark \\
 &= 2(11) - 5(-7) - 4(-5) \checkmark \\
 &= 77 \checkmark
 \end{aligned} \tag{4}$$

[20]

VRAAG 3

$$\begin{aligned}
 3.1 \quad 2 \sin \alpha \cdot \tan \alpha - \tan \alpha &= 1 - 2 \sin \alpha \\
 \tan \alpha (2 \sin \alpha - 1) - 1 + 2 \sin \alpha &= 0 \checkmark \\
 (2 \sin \alpha - 1)(\tan \alpha + 1) &= 0 \checkmark \\
 \sin \alpha = \frac{1}{2} \quad \text{en} \quad \tan \alpha &= -1 \\
 \alpha = \sin^{-1}\left(\frac{1}{2}\right) \quad \text{en} \quad \alpha &= \tan^{-1}(-1) \checkmark \\
 \text{ref hoek} = 30^\circ \quad \text{en} \quad \text{ref hoek} &= 45^\circ \checkmark \\
 = 30^\circ; 150^\circ \quad \text{en} \quad 135^\circ; 315^\circ &\checkmark \\
 = \{-30^\circ; +30^\circ\} \checkmark
 \end{aligned} \tag{6}$$

$$\begin{aligned}
 3.2 \quad &= \frac{\cos 2p}{\cos p - \sin p} \\
 &= \frac{\cos^2 p - \sin^2 p}{\cos p - \sin p} \checkmark \\
 &= \frac{(\cos p - \sin p)(\cos p + \sin p)}{(\cos p - \sin p)} \checkmark \\
 &= (\cos p + \sin p) \checkmark
 \end{aligned} \tag{3}$$

$$\begin{aligned}
 3.3 \quad \sin(\alpha - \beta) &= \sin \alpha \cdot \cos \beta - \cos \alpha \cdot \sin \beta \checkmark \\
 &= \frac{4}{5} \cdot \frac{12}{13} - \frac{3}{5} \cdot \frac{5}{13} \checkmark \\
 &= \frac{84}{65} - \frac{15}{65} \checkmark \\
 &= \frac{69}{65} \checkmark
 \end{aligned}$$

$$\begin{aligned}
 3.4 \quad \cos 2x &= \cos(x+x) \\
 &= \cos x \cdot \cos x - \sin x \cdot \sin x \checkmark \\
 &= \cos^2 x - \sin^2 x \\
 &= 1 - \sin^2 x - \sin^2 x \checkmark \\
 &= 1 - 2\sin^2 x \checkmark
 \end{aligned}
 \tag{3}$$

$$\begin{aligned}
 3.5 \quad (\sec x - \tan x)(\sec x + \tan x) \\
 &= \sec^2 x + \sec x \cdot \tan x - \sec x \cdot \tan x - \tan^2 x \checkmark \checkmark \checkmark \\
 &= 1 \checkmark
 \end{aligned}
 \tag{4}$$

[20]

VRAAG 4

$$\begin{aligned}
 4.1 \quad \lim_{h \rightarrow 0} \frac{(x+h)^3 - f(x)}{h} \\
 \lim_{h \rightarrow 0} = \frac{(x^3 + \frac{3x^2 \cdot h}{1!} + \frac{3(2)xh^2}{2!} + \frac{(3)(2)(1)x^0 h^3}{3!}) - (-x^3)}{h} \checkmark \checkmark \\
 \lim_{h \rightarrow 0} = \frac{-x^3 + 3x^2 h - 3xh^2 - h^3 + x^3}{h} \checkmark \\
 \lim_{h \rightarrow 0} = \frac{h(-3x^2 - 3xh - h^2)}{h} \checkmark \\
 \lim_{h \rightarrow 0} = -3x^2 \checkmark
 \end{aligned}$$

$$\begin{aligned}
 4.2 \quad \text{Vir TP } y' = 0 \\
 3x^2 - 24x + 36 = 0 \checkmark \\
 (x-2)(x-6) = 0 \checkmark \\
 x = 2 \text{ of } x = 6 \checkmark \\
 y - \text{waardes} \\
 y = 2^3 - 12 \cdot 2^2 + 36(2) \\
 = 56 \\
 y = 6^3 - 12 \cdot 6^2 + 36(6) \\
 = 0 \\
 \therefore TP_1 = (2; 56) \text{ en } TP_2 = (6; 0) \checkmark \checkmark
 \end{aligned}$$

$$\begin{aligned}
 4.3 \quad y &= 5\sqrt{u} \\
 \frac{dy}{du} &= \frac{5}{2\sqrt{u}} \checkmark & u &= \ln x \\
 \frac{dy}{dx} &= \frac{dy}{du} \times \frac{du}{dx} \checkmark & \frac{du}{dx} &= \frac{1}{x} \checkmark \\
 \frac{dy}{dx} &= \frac{5}{2\sqrt{u}} \times \frac{1}{x} \checkmark \\
 \frac{dy}{dx} &= \frac{5}{2x\sqrt{\ln x}} \checkmark
 \end{aligned}$$

4.4 $y = x^{\frac{3}{2}}(x^{-4} + 2x^{-1} + x^2)$ ✓
 $y = x^{-\frac{5}{2}} + 2x^{\frac{1}{2}} + x^{\frac{7}{2}}$ ✓
 $\frac{dx}{dy} = -\frac{5}{2}x^{-\frac{5}{2}} + x^{\frac{3}{2}} + x^{\frac{5}{2}}$ ✓

4.5 $\frac{dy}{dx} = \left(2\ln x \times \frac{1}{x}\right)e^x + \ln^2 x \cdot e^x$ ✓

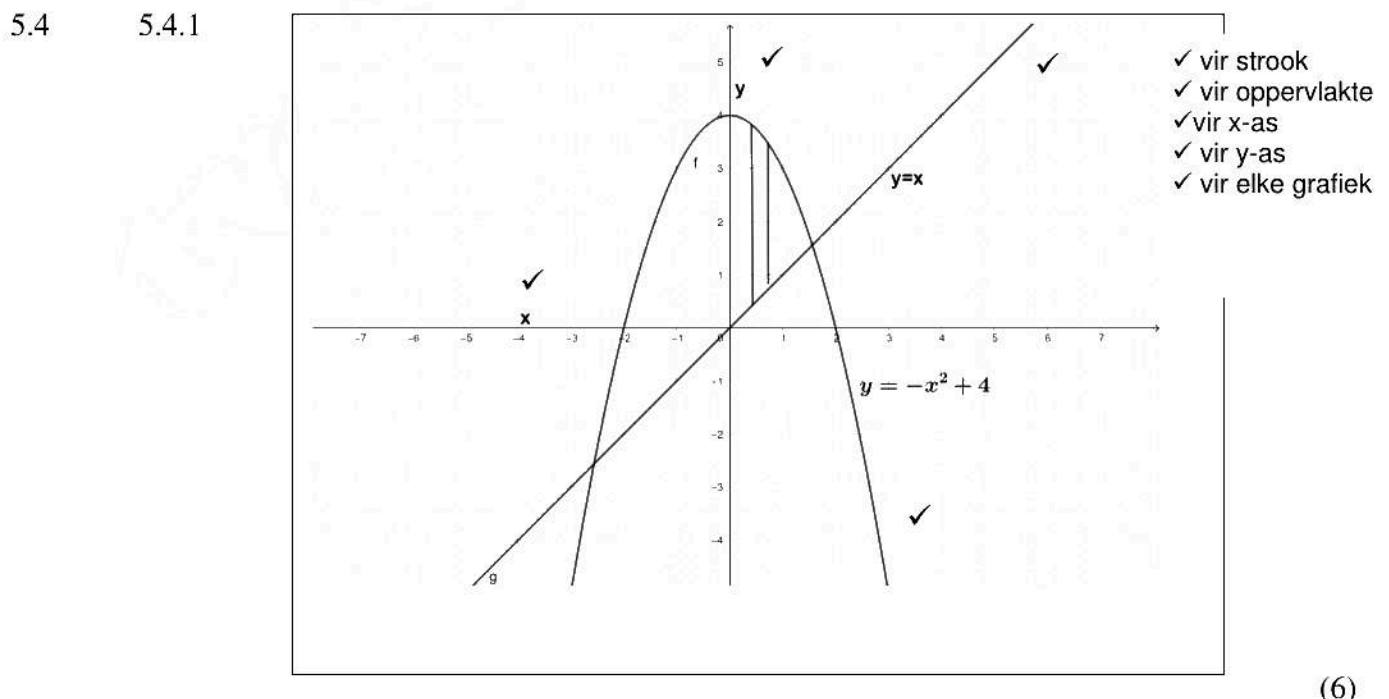
(5 × 5) [25]

VRAAG 5

5.1 $\int \cos 2x \, dx$ ✓
 $= \frac{\sin 2x}{2} + c$ ✓ ✓ (3)

5.2 $= \frac{e^{3x}}{5} + \frac{\pi^{3x}}{3 \ln x} - \frac{10^{2x}}{2 \ln 10} + x^2 + px + c$ ✓ ✓ ✓ ✓ ✓ ✓ ✓ (6)

5.3 $\int_1^3 \left(\frac{5}{x} + 6\right) dx$
 $= [5 \ln x + 6x]_1^3$ ✓ ✓
 $= 5 \ln 3 + 6(3) - (5 \ln 1 + 6(1))$ ✓ ✓
 $= 17,49$ ✓ (5)



(6)

$$\begin{aligned} 5.4.2 \quad & \int_0^{1.56} (y_2 - y_1) dx \checkmark \\ & \int_0^{1.56} (-x^2 + 4 - x) dx \checkmark \\ & \left[-\frac{x^3}{3} + 4x - \frac{x^2}{2} \right]_0^{1.56} \checkmark \\ & = \frac{-1(1.56)^3}{3} + 4(1.56) - \frac{(1.56)^2}{2} - (0) \checkmark \\ & = 9,997 \, u^2 \checkmark \end{aligned}$$

(5)
[25]

TOTAAL: 100