



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

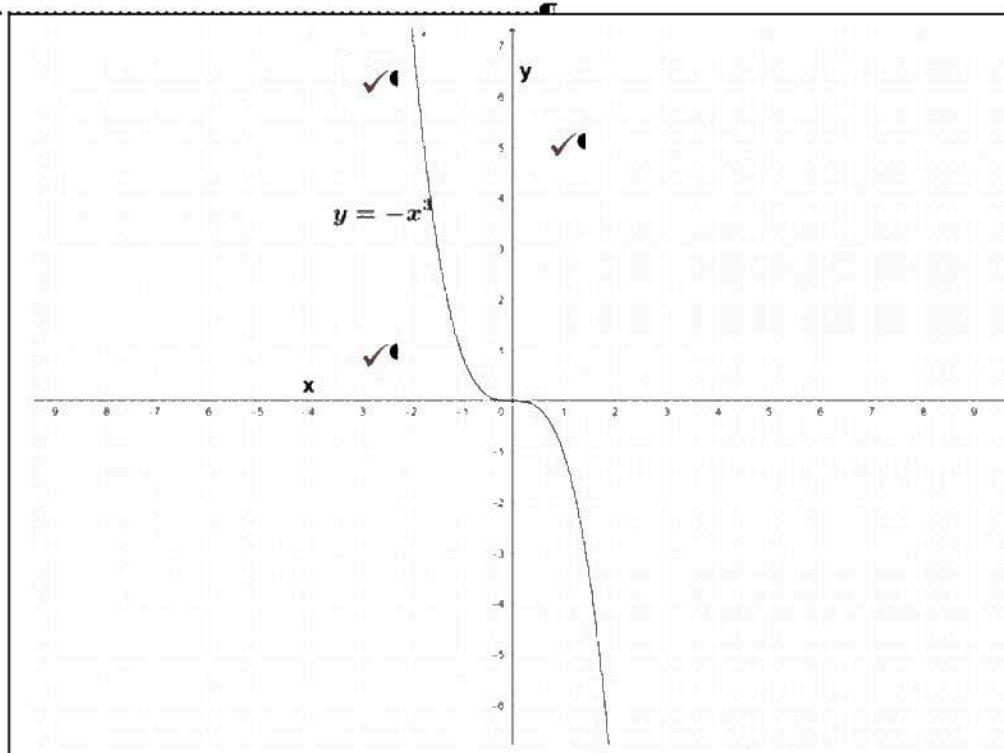
MATHEMATICS N4

29 July 2026

This marking guideline consists of 9 pages.

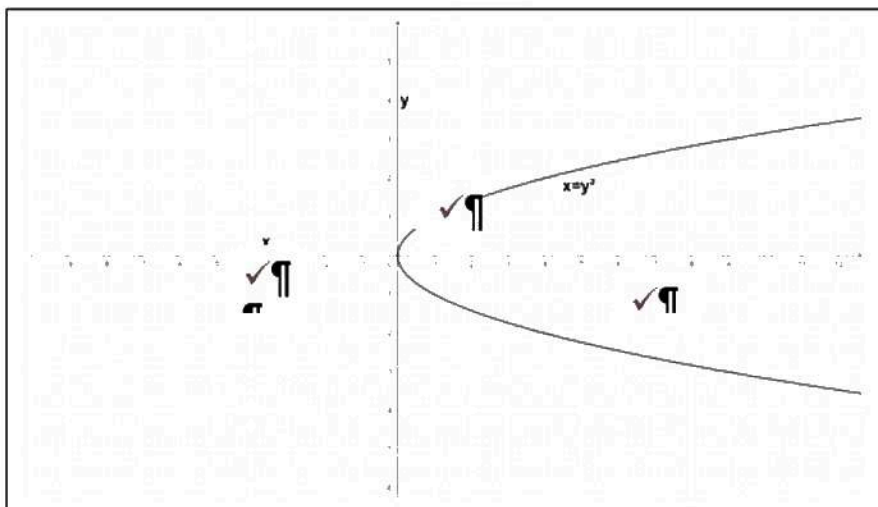
QUESTION 1

1.1



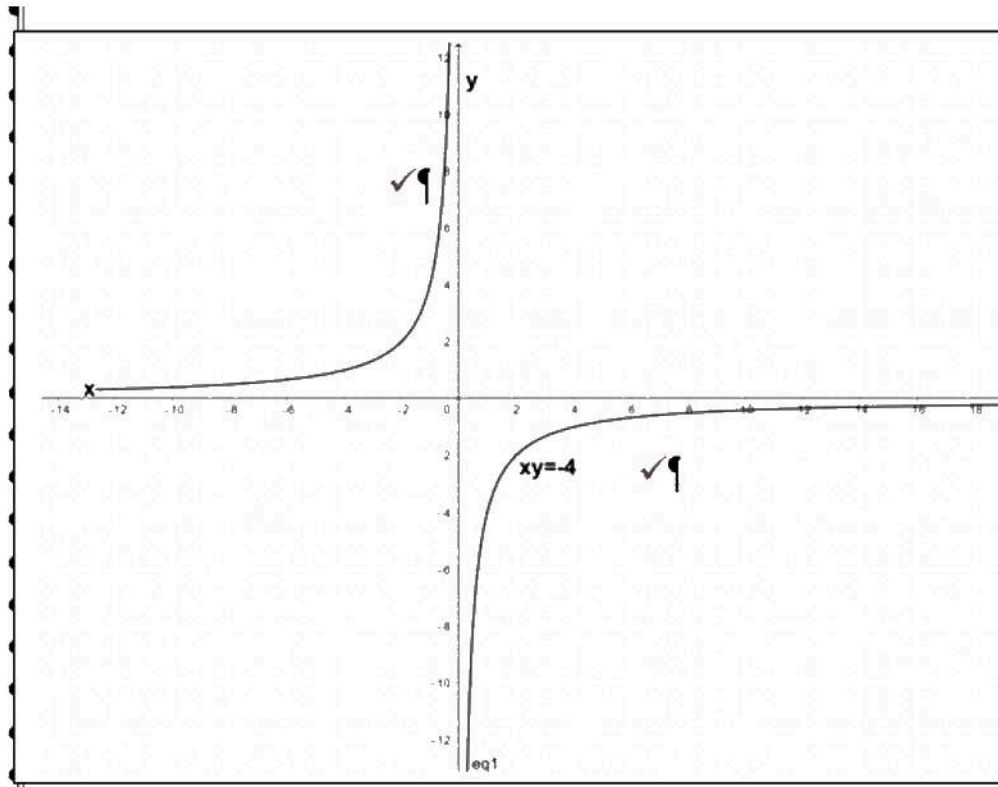
(3)

1.2



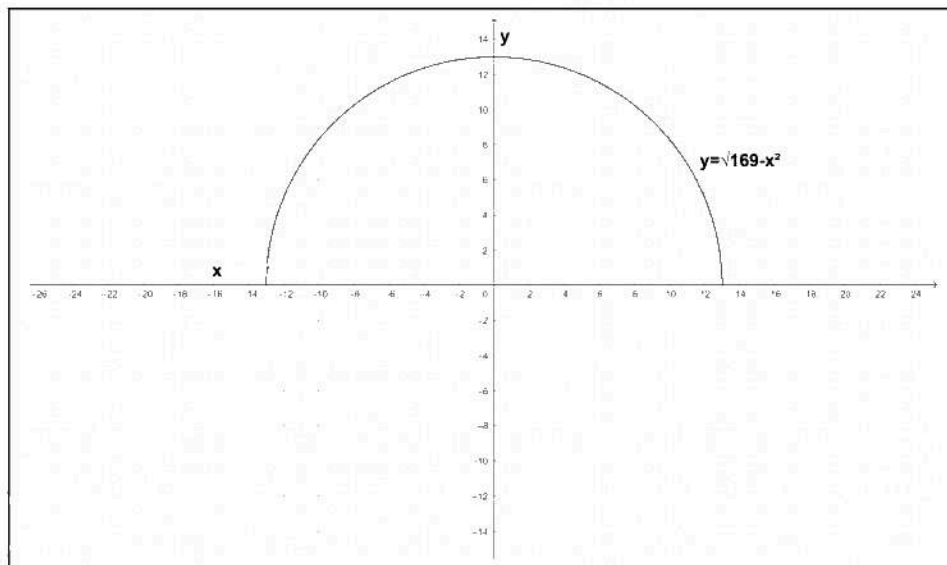
(3)

1.3



(2)

1.4



(2)
[10]

QUESTION 2

2.1

$$\begin{aligned}\Delta_0 &= \begin{vmatrix} 1 & 4 & 8 \\ 2 & -5 & -6 \\ 0 & 1 & -4 \end{vmatrix} \quad \checkmark \\ &= \begin{vmatrix} -5 & -6 \\ 1 & -4 \end{vmatrix} - 4 \begin{vmatrix} 2 & -6 \\ 0 & -4 \end{vmatrix} + 8 \begin{vmatrix} 2 & -5 \\ 0 & 1 \end{vmatrix} \quad \checkmark \\ &= 1(20+6) - 4(-8-0) + 8(2-0) \quad \checkmark \\ &= 74 \quad \checkmark \\ \Delta_c &= \begin{vmatrix} 1 & 4 & 0 \\ 2 & -5 & -2 \\ 0 & 1 & -3 \end{vmatrix} \quad \checkmark \\ &= \begin{vmatrix} -5 & -2 \\ 1 & -3 \end{vmatrix} - 4 \begin{vmatrix} 2 & -2 \\ 0 & -3 \end{vmatrix} + 0 \begin{vmatrix} 2 & -5 \\ 0 & 1 \end{vmatrix} \quad \checkmark \\ &= 1(15+2) - 4(-6)+0 \\ &= 41 \quad \checkmark\end{aligned}$$

$$\therefore C = \frac{\Delta_c}{\Delta_0} = \frac{41}{74} = 0,554 \quad \checkmark$$

(8)

2.2

$$\begin{aligned}|r| &= \sqrt{(-1)^2 + (-3)^2} \\ &= \sqrt{10} \quad \checkmark \\ \tan \theta &= \frac{y}{x} = \frac{-3}{-1} = 3 \\ \theta &= \tan^{-1}(3) = 71,565^\circ \\ \theta &= 180^\circ + 71,565^\circ = 251,565^\circ \quad \checkmark \\ \therefore &= \left(\sqrt{10} \angle 251,565^\circ \right)^3 \\ &= 31,623 \angle 754,695^\circ \quad \checkmark \\ &= 31,623 (\cos 754,695^\circ + i \sin 754,695^\circ) \\ &= 26 + i18 \quad \checkmark\end{aligned}$$

(4)

$$\begin{aligned}
 2.3 \quad x^2 - 6x + 34 &= 0 \\
 x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\
 &= \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(34)}}{2(1)} \quad \checkmark \\
 &= \frac{6 \pm \sqrt{-100}}{2} \quad \checkmark \\
 &= \frac{6 \pm 10i}{2} \quad \checkmark \\
 &= 3 \pm 5i \quad \checkmark
 \end{aligned}
 \tag{4}$$

$$\begin{aligned}
 2.4 \quad (3 - j4)^2 &= \frac{-x - jy}{j^2} \\
 9 - j24 + j^2 16 &= \frac{-x - jy}{-1} \quad \checkmark \\
 -7 - j24 &= x + jy \\
 x &= -7 \quad \checkmark \\
 y &= -24 \quad \checkmark
 \end{aligned}
 \tag{4}$$

[20]

QUESTION 3

$$\begin{aligned}
 3.1 \quad 2 \sin x \cdot \cos x - \cos^2 x - 2 \sin x + \cos x &= 0 \\
 \cos x(2 \sin x - \cos x) - (2 \sin x - \cos x) &= 0 \quad \checkmark \\
 (2 \sin x - \cos x)(\cos x - 1) &= 0 \quad \checkmark \\
 \tan x &= \frac{1}{2} \text{ or } \cos x = 1 \quad \checkmark \\
 x &= \tan^{-1}(0.5) \text{ or } x = 0^\circ, 360^\circ \\
 \text{ref} \angle x &= 26,57^\circ \text{ or } x = 0^\circ \quad \checkmark \\
 \therefore GS \ x &= \{0^\circ; 26,57^\circ\} \quad \checkmark
 \end{aligned}
 \tag{5}$$

$$\begin{aligned}
 3.2 \quad 3.2.1 \quad &= \frac{\cos^2 x}{\sin x \cdot \sin x} + 1 \quad \checkmark \\
 &= \frac{\cos^2 x}{\sin^2 x} + 1 \\
 &= \frac{\cos^2 x + \sin^2 x}{\sin^2 x} \quad \checkmark \\
 &= \frac{1}{\sin^2 x} \quad \checkmark \\
 &= \sec^2 x \quad \checkmark
 \end{aligned}$$

$$\begin{aligned}
 3.2.2 \quad & \frac{1}{\cos y} \cdot \frac{\sin y}{\cos y} \quad \checkmark \\
 & = \frac{1 + \sin y}{\cos y} \quad \checkmark
 \end{aligned}
 \tag{3}$$

$$\begin{aligned}
 3.3 \quad & \cos 105^\circ \\
 & = \cos(60^\circ + 45^\circ) \\
 & = \cos 60^\circ \cdot \cos 45^\circ - \sin 60^\circ \cdot \sin 45^\circ \quad \checkmark \\
 & = \frac{1}{2} \cdot \frac{1}{\sqrt{2}} - \frac{\sqrt{3}}{2} \cdot \frac{1}{\sqrt{2}} \quad \checkmark \quad \square \\
 & = \frac{1}{2\sqrt{2}} - \frac{\sqrt{3}}{2\sqrt{2}} \quad \checkmark \\
 & = \frac{1 - \sqrt{3}}{2\sqrt{2}} \quad \checkmark
 \end{aligned}
 \tag{4}$$

$$\begin{aligned}
 3.4 \quad & LHS = \frac{2 \sin p + 1}{\sin 2p + \cos p} \\
 & = \frac{2 \sin p + 1}{2 \sin p \cos p + \cos p} \quad \checkmark \\
 & = \frac{(2 \sin p + 1)}{\cos p (2 \sin p + 1)} \quad \checkmark \\
 & = \frac{1}{\cos p} \quad \checkmark \\
 & = \sec p \\
 & = RHS \quad \checkmark
 \end{aligned}
 \tag{4}$$

[40]

QUESTION 4

4.1 For TP Let $y' = 0$

$$-6x^2 + 6x + 12 = 0 \quad \checkmark$$

$$x^2 - x - 2 = 0$$

$$(x-2)(x+1) = 0$$

$$\therefore x_1 = 2 \text{ and } x_2 = -1 \quad \checkmark \checkmark$$

For y -values:

$$\text{if } x = 2 \text{ then } y = -2(2)^3 + 3(2)^2 + 12(2) - 5 = 15$$

$$\text{if } x = -1 \text{ then } y = -2(-1)^3 + 3(-1)^2 + 12(-1) - 5 = -12$$

$$\therefore \text{TP}_1 = (2; 15) \text{ and } \text{TP}_2 = (-1; -12) \quad \checkmark \checkmark$$

For points of inflection let $y'' = 0$:

$$-12x + 6 = 0 \quad \checkmark$$

$$\therefore x = 0,5$$

$$y = -2(0,5)^3 + 3(0,5)^2 + 12(0,5) - 5 = 1,5$$

$$(0,5; 1,5) \quad \checkmark \checkmark$$

(8)

4.2

$$= \lim_{x \rightarrow 0} \frac{x^3 + 6x^2 + 12x + 8 - 8}{x} \quad \checkmark$$

$$= \lim_{x \rightarrow 0} \frac{x^3 + 6x^2 + 12x}{x} \quad \checkmark$$

$$= \lim_{x \rightarrow 0} x^2 + 6x + 12 \quad \checkmark$$

$$= 12 \quad \checkmark$$

(4)

4.3

$$y = \sqrt{\cot x}$$

$$u = \cot x$$

$$y = \sqrt{u} = u^{\frac{1}{2}}$$

$$\frac{dy}{du} = \frac{1}{2\sqrt{u}} \quad \checkmark$$

$$\frac{du}{dx} = -\operatorname{cosec}^2 x \quad \checkmark$$

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

$$= \frac{1}{2\sqrt{u}} \times -\operatorname{cosec}^2 x \quad \checkmark$$

$$= \frac{-\operatorname{cosec}^2 x}{2\sqrt{\cot x}} \quad \checkmark$$

(4)

4.4

$$y = \operatorname{cosec} x - \cot x - 3 \sin x + 3x^{-1} + x^{\frac{1}{2}}$$

$$\frac{dy}{dx} = -\operatorname{cosec} x \cdot \cot x + \operatorname{cosec}^2 x - 3 \cos x - 3x^{-2} + \frac{1}{2}x^{-\frac{1}{2}} \quad \checkmark$$

4.5 $y = 10^x \cdot \tan x$

Let $u = 10^x$ and $v = \tan x$

$\frac{du}{dx} = 10^x \cdot \ln 10$ and $\frac{dv}{dx} = \sec^2 x$

$\therefore \frac{dy}{dx} = (10^x)(\sec^2 x) + (\tan x)(10^x \cdot \ln 10)$

(4)
[25]

QUESTION 5

5.1 $= 2a \int 5^{2x} dx$

let $u = 2x$

$\frac{du}{dx} = 2 \therefore dx = \frac{du}{2}$

$= 2a \int 5^u dx$

$= 2a \int 5^u \cdot \frac{du}{2}$

$= a \int 5^u du$

$= \frac{a \cdot 5^u}{\ln 5} + c$

$= \frac{a \cdot 5^{2x}}{\ln 5} + c$

(4)

5.2

$= \frac{3x^6}{6} - \frac{2^{10x}}{10 \cdot \ln 2} + \frac{4e^{3x}}{3} + \frac{4 \cos 4x}{4} - \ln x + ax + c$

(7)

5.3

$= \left[\frac{4 \cdot \sin 2x}{2} \right]_0^{45^\circ}$

$= [2 \sin 2x]_0^{45^\circ}$

$= 2 - 0$

$= 2u^2$

(3)

5.4

5.4.1

$$y = x^2 \quad \text{and} \quad y^2 = x$$

$$\therefore x^2 = \sqrt{x}$$

$$x^4 - x = 0$$

$$x(x^3 - 1) = 0$$

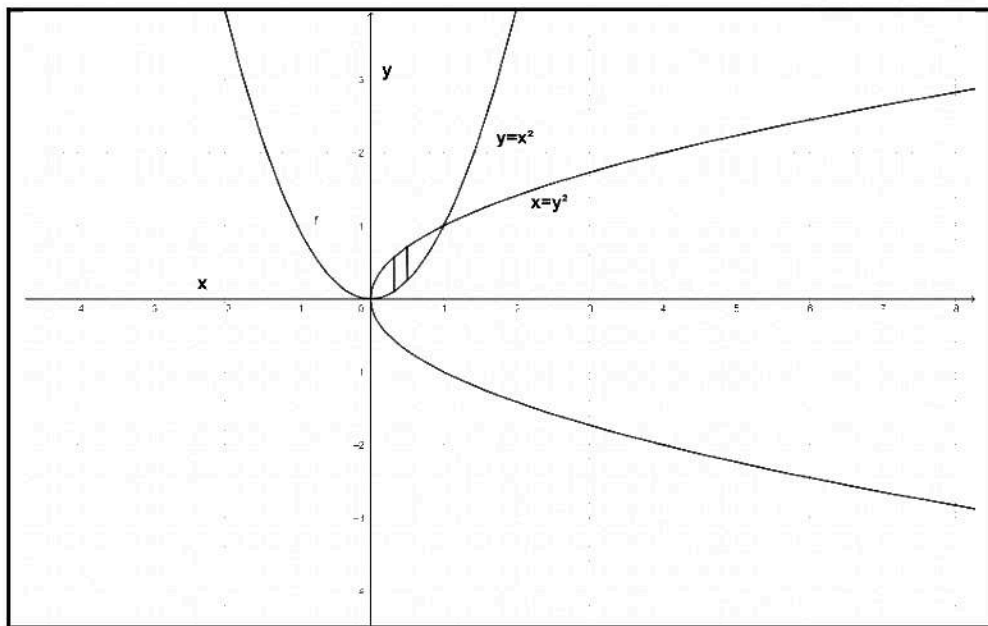
$$x = 0 \quad \text{or} \quad x = 1$$

$$y = 0 \quad \text{or} \quad y = 1$$

$$(0;0);(1;1) \quad \checkmark \checkmark$$

✓ for each graph
✓ for the strip
✓ for the area

(5)



5.4.2

$$A = \int_0^1 (y_2 - y_1) dx \quad \checkmark \checkmark$$

$$= \int_0^1 (\sqrt{x} - x) dx \quad \checkmark \checkmark$$

$$= \left[\frac{x^{\frac{3}{2}}}{\frac{3}{2}} - \frac{x^2}{2} \right]_0^1 \quad \checkmark \checkmark$$

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

$$= \frac{1}{6} u^2 \quad \text{or} \quad 0.1667 u^2 \quad \checkmark \checkmark$$

(6)
[25]

TOTAL: 100