



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

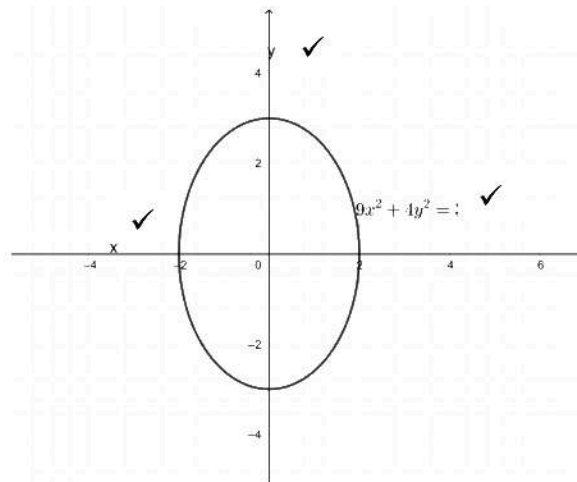
MATHEMATICS N4

28 March 2024

This marking guideline consists of 7 pages.

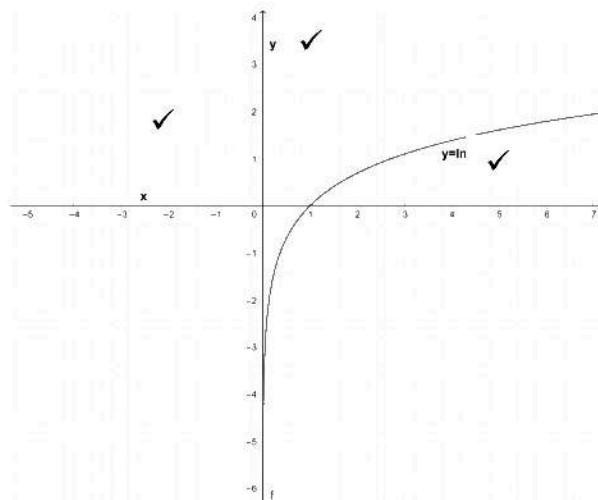
QUESTION 1

1.1



(3)

1.2

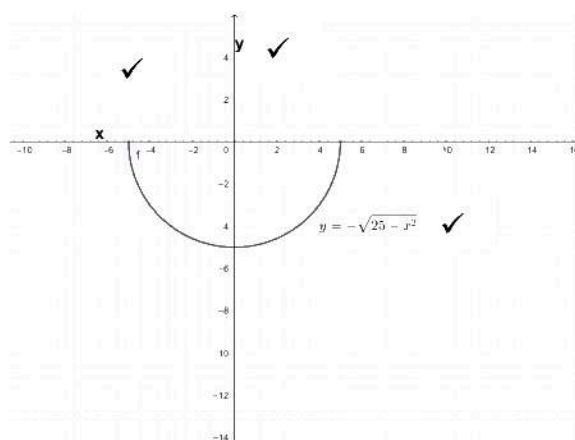


(3)

1.3 $x \geq 0$

(1)

1.4



(3)

[10]

QUESTION 2

2.1

$$\Delta_0 = \begin{vmatrix} 4 & 2 \\ -2 & 3 \end{vmatrix}$$

$$= 12 + 4$$

$$= 16 \checkmark$$

$$\Delta_x = \begin{vmatrix} 4 & 2 \\ 2 & 3 \end{vmatrix}$$

$$= 12 - 4$$

$$= 8 \checkmark$$

$$\Delta_y = \begin{vmatrix} 4 & 4 \\ -2 & 2 \end{vmatrix}$$

$$= 8 + 8$$

$$= 16 \checkmark$$

$$\therefore x = \frac{D_x}{D} = \frac{8}{16} = \frac{1}{2} \checkmark$$

$$\therefore y = \frac{D_y}{D} = \frac{16}{16} = 1 \checkmark$$

(5)

2.2

2.2.1

$$\begin{vmatrix} 3 & 6 \\ 2 & 1 \end{vmatrix} \checkmark$$

$$= 3 - 12$$

$$= -9 \checkmark$$

2.2.2

$$(-1)^6 \begin{vmatrix} 4 & 2 \\ 3 & 6 \end{vmatrix} \checkmark$$

$$= 24 - 6$$

$$= 18 \checkmark$$

(2 × 2)

(4)

2.3

$$\frac{3 \angle 60^\circ \cdot 2 \angle 6^\circ}{6 \angle 50^\circ} \checkmark$$

$$= \frac{6 \angle 66^\circ}{6 \angle 50^\circ} \checkmark$$

$$= 66^\circ - 50^\circ \checkmark$$

$$= 16^\circ \checkmark$$

$$= \cos 16^\circ + i \sin 16^\circ$$

(4)

$$\begin{aligned}
 2.4 \quad & \frac{j^2 \cdot j + (j^2)^2}{j^2 - (j^2)j} \\
 &= \frac{-j+1}{-1-j} \times \frac{-1+j}{-1+j} \checkmark \\
 &= \frac{j-j^2-1+j}{1-j+j-j^2} \checkmark \\
 &= \frac{2j}{2} \\
 &= j \checkmark
 \end{aligned} \tag{3}$$

$$\begin{aligned}
 2.5 \quad & m + n = 7 \dots\dots\dots(1) \checkmark \\
 & m - n = 2 \dots\dots\dots(2) \checkmark \\
 & \therefore 2m = 9 \\
 & m = \frac{9}{2} \checkmark \\
 & \therefore \text{substituting } m \text{ in (1)} \\
 & \frac{9}{2} + n = 7 \\
 & n = \frac{5}{2} \checkmark
 \end{aligned} \tag{4}$$

[20]

QUESTION 3

$$\begin{aligned}
 3.1 \quad & \text{LHS} = \frac{2 \sin^3 x + (\sin 2x)(\cos x)}{2 \cos x} \\
 &= \frac{2 \sin^3 x + 2 \sin x \cos x \cdot \cos x}{2 \cos x} \checkmark \\
 &= \frac{2 \sin^3 x + 2 \sin x \cdot \cos^2 x}{2 \cos x} \checkmark \\
 &= \frac{2 \sin x (\sin^2 x + \cos^2 x)}{2 \cos x} \checkmark \\
 &= \tan x = \text{RHS} \checkmark
 \end{aligned} \tag{5}$$

$$\begin{aligned}
 3.2 \quad & \frac{\sin \theta \cdot \tan \theta \cdot \cos \theta}{\sin \theta \cdot \cos \theta - \tan \theta} \\
 &= -1 \checkmark
 \end{aligned} \tag{5}$$

$$\begin{aligned}
 3.3 \quad \frac{1}{\sec 105^\circ} &= \cos 105^\circ \checkmark \\
 &= \cos(60^\circ + 45^\circ) \\
 &= \cos 60^\circ \cdot \cos 45^\circ - \sin 60^\circ \cdot \sin 45^\circ \checkmark \\
 &= \frac{1}{2} \cdot \frac{1}{\sqrt{2}} - \frac{\sqrt{3}}{2} \cdot \frac{1}{\sqrt{2}} \checkmark \\
 &= \frac{1}{2\sqrt{2}} - \frac{\sqrt{3}}{2\sqrt{2}} \checkmark \\
 &= \frac{1-\sqrt{3}}{2\sqrt{2}} \checkmark
 \end{aligned}
 \tag{5}$$

$$\begin{aligned}
 3.4 \quad &= \frac{1}{2} [\cos(45^\circ - 30^\circ) + \sqrt{3}(\sin(45^\circ - 30^\circ))] \checkmark \\
 &= \frac{1}{2} [\cos 45^\circ \cos 30^\circ + \sin 45^\circ \sin 30^\circ + \sqrt{3}(\sin 45^\circ \cos 30^\circ - \sin 30^\circ \cos 45^\circ)] \checkmark \\
 &= \frac{1}{2} \left[\frac{1}{\sqrt{2}} \cdot \frac{\sqrt{3}}{2} + \frac{1}{\sqrt{2}} \cdot \frac{1}{2} + \sqrt{3} \left(\frac{1}{\sqrt{2}} \cdot \frac{\sqrt{3}}{2} - \frac{1}{2} \cdot \frac{1}{\sqrt{2}} \right) \right] \checkmark \\
 &= \frac{1}{2} \left[\frac{\sqrt{3}}{2\sqrt{2}} + \frac{1}{2\sqrt{2}} + \sqrt{3} \left(\frac{\sqrt{3}}{2\sqrt{2}} - \frac{1}{2\sqrt{2}} \right) \right] \\
 &= \frac{1}{2} \left[\frac{\sqrt{3}+1}{2\sqrt{2}} + \frac{3-\sqrt{3}}{2\sqrt{2}} \right] \checkmark \\
 &= \frac{1}{\sqrt{2}} \checkmark
 \end{aligned}
 \tag{5}$$

[20]

QUESTION 4

$$\begin{aligned}
 4.1 \quad (x-2)^5 &= x^5 + \frac{5x^4(-2)}{1!} + \frac{5(4)x^3(-2)^2}{2!} + \frac{5(4)(3)x^2(-2)^3}{3!} \\
 &= x^5 + -10x^4 + 40x^3 - 80x^2 \checkmark \checkmark \checkmark \checkmark
 \end{aligned}
 \tag{4}$$

$$\begin{aligned}
 4.2 \quad \lim_{t \rightarrow 2} \left(\frac{t^3 - 8}{t - 2} \right) \\
 &= \frac{(t-2)(t^2 + 2t + 4)}{(t-2)} \checkmark \checkmark \\
 &= (2)^2 + 2(2) + 4 \checkmark \\
 &= 12 \checkmark
 \end{aligned}
 \tag{4}$$

4.3

$$\begin{aligned}
 y &= \sqrt{u} = u^{\frac{1}{2}} & u &= \cos ecx \\
 \frac{dy}{du} &= \frac{1}{2} u^{-\frac{1}{2}} \quad \checkmark & \frac{du}{dx} &= -\cos ecx \cdot \cot x \quad \checkmark \\
 \therefore \frac{dy}{dx} &= \frac{dy}{du} \times \frac{du}{dx} \\
 &= \frac{1}{2\sqrt{\cos ecx}} \times -\cos ecx \cdot \cot x \quad \checkmark \\
 &= \frac{-1}{2} \sqrt{\cos ecx} \cot x \quad \checkmark
 \end{aligned}$$

(4)

4.4

$$\frac{dy}{dx} = \frac{\left(\frac{1}{\tan x} \cdot \sec^2 x \right) \cdot \ln x + \ln \tan x \cdot \frac{1}{x}}{(\ln x)^2} \quad \checkmark$$

(4)

4.5

$$3y^2 - \frac{2}{y} - \cos ecy \cdot \cot y - \sec^2 y + 0 + \cos y + \frac{3}{2} \cdot 5^{3y} \ln 5 + \frac{9}{4} e^{9y}$$

(9)

[25]

QUESTION 5

5.1

$$\begin{aligned}
 &\left[\frac{3 \sin 3x}{3} \right]_0^\pi \quad \checkmark \checkmark \\
 &= \sin 3(\pi) - \sin 3(0) \quad \checkmark \checkmark \\
 &= 0 \quad \checkmark
 \end{aligned}$$

(5)

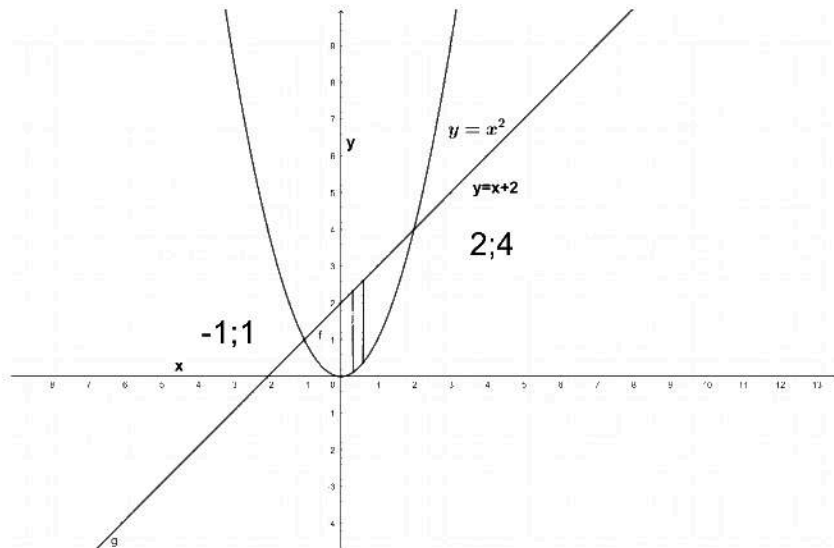
5.2

$$\begin{aligned}
 &\int \left(2x^{\frac{5}{6}} - 2x^{\frac{-1}{2}} + 4x^{\frac{4}{3}} + 4 \right) dx \quad \checkmark \\
 &= \frac{12x^{\frac{11}{6}}}{\frac{11}{6}} - \frac{2x^{\frac{1}{2}}}{\frac{1}{2}} + \frac{4x^{\frac{7}{3}}}{\frac{7}{3}} + 4x + c \quad \checkmark \\
 &= \frac{12x^{\frac{11}{6}}}{11} - 4x^{\frac{1}{2}} + \frac{12x^{\frac{7}{3}}}{7} + 4x + c \quad \checkmark
 \end{aligned}$$

(6)

5.3

5.3.1



- ✓✓ for each graph
- ✓✓ for each coordinate
- ✓ for the strip
- ✓ for the area

(6)

5.3.2

$$\begin{aligned}
 A_x &= \int_{x_1}^{x_2} (y_2 - y_1) dx \quad \checkmark \\
 &= \int_{-1}^2 (x + 2 - x^2) dx \quad \checkmark \\
 &= \left[\frac{x^2}{2} + 2x - \frac{x^3}{3} \right]_{-1}^2 \quad \checkmark \\
 &= \frac{(2)^2}{2} + 2(2) - \frac{(2)^3}{3} - \left(\frac{(-1)^2}{2} + 2(-1) - \frac{(-1)^3}{3} \right) \quad \checkmark \\
 &= \frac{9}{2} / 4,5u^2 \quad \checkmark
 \end{aligned}$$

(5)

5.4

$$\begin{aligned}
 &\int \frac{1}{\cos^2 x} dx \quad \checkmark \\
 &= \int \sec^2 x dx \quad \checkmark \\
 &= \tan x + c \quad \checkmark
 \end{aligned}$$

(3)

[25]

TOTAL: 100