

α MATHEMATICS

March 2022

Grade 12

Time: 1 hour

Total: 70 marks

INSTRUCTIONS AND INFORMATION

Please read the following instructions carefully before answering any questions.

1. This question paper consists of four pages, a formula sheet of one page and an answer sheet.
2. Answer all seven questions.
3. Non-programmable calculators may be used, unless otherwise indicated.
4. Unless indicated otherwise, all answers, where applicable, must be given correct to **two decimal places**.
5. All necessary calculations must be shown. The correct answer on its own will not necessarily lead to full marks.
6. All angles are given in radians. Answers must be given in radians where applicable.
7. The diagrams in the question paper are not necessarily drawn to scale.
8. Write neatly and legibly.

Question 1**[14 marks]**

The following questions have only ONE correct answer. Only mark the correct letter, A, B, C or D with a X (cross) on the answer sheet provided.

1.1 Which one of the following statements is correct?

(A) $\frac{1}{\cos x + i \sin x} = \cos x - i \sin x$

(B) $\cos x - i \sin x = \cos x + i \sin x$

(C) $\frac{1}{\cos x - i \sin x} = \cos x - i \sin x$

(D) $\frac{1}{\cos x + i \sin x} = \cos x + i \sin x$

1.2 $3 \ln|x| - \ln|y| - \ln|z|$ can be written as

(A) $\ln \frac{3xz}{y}$

(B) $\ln \frac{3x}{yz}$

(C) $\ln \frac{x^3 z}{y}$

(D) $\ln \frac{x^3}{yz}$

1.3 The domain of $y = \ln(x + 1)$ is...

(A) $x > 1, x \in \mathbb{R}$

(B) $x > -1, x \in \mathbb{R}$

(C) $x > 0, x \in \mathbb{R}$

(D) $x > 2, x \in \mathbb{R}$

1.4 The product of $2e^{\frac{\pi}{2}i}$ and $3e^{\frac{\pi}{3}i}$ is...

(A) $5e^{\frac{5\pi}{6}i}$

(B) $5e^{\frac{\pi}{6}i}$

(C) $6e^{\frac{5\pi}{6}i}$

(D) $6e^{\frac{\pi}{6}i}$

1.5 If $f(x) = e^x$, which of the following statements is false?

(A) $f(x) = f'(x)$

(B) $\int f(x) = f'(x)$

(C) $f^{-1}(x) = f(x)$

(D) $\int f'(x) = f'(x)$

1.6 $e^{\ln x} =$

(A) $-e$

(B) e

(C) $-x$

(D) x

Question 5**[8 marks]**

Determine the following integrals:

5.1 $\int 4^{7x} + e^{8x} dx$ (5)

5.2 $\int e^{-\frac{2}{3-x}} dx$ (3)

Question 6**[10 marks]**

$p = 1 - \sqrt{3}i$ and $t = -2\sqrt{2} - 2\sqrt{2}i$

6.1 Convert p and t to polar form. (4)

6.2 Calculate $\frac{p}{t}$. (2)

6.3 Use De Moivre's theorem to show that $\left(\frac{p}{t}\right)^6 = \frac{i}{64}$ (4)

Question 7**[8 marks]**

Given: $\sqrt{\ln y} + \frac{1}{y} = x$

Use implicit differentiation to determine $\frac{dy}{dx}$. (8)

- END OF TEST -