Neap

Trial Examination 2022

HSC Year 12 Mathematics Extension 2

General Instructions

- Reading time – 10 minutes
- Working time – 3 hours
- Write using black pen
- Calculators approved by NESA may be used
- A reference sheet is provided at the back of this paper
- For questions in Section II, show relevant mathematical reasoning and/or calculations

Total Marks: 100

SECTION I – 10 marks (pages 2–5)

- Attempt Questions 1–10
- Allow about 15 minutes for this section

SECTION II – 90 marks (pages 6–11)

- Attempt Questions 11–16
- Allow about 2 hours and 45 minutes for this section

Students are advised that this is a trial examination only and cannot in any way guarantee the content or the format of the 2022 HSC HSC Year 12 Mathematics Extension 2 examination.

SECTION I

10 marks
Attempt Questions 1–10
Allow about 15 minutes for this section

Use the multiple-choice answer sheet for Questions 1–10.

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1 Let the point P on an Argand diagram represent the complex number z. After being multiplied by another complex number, ω, P is rotated 90° clockwise and $|z|$ is enlarged by a factor of 3.
Which of the following is the value of ω?

A. $3i$

B. $-3i$

C. e^{-3i}

D. $3e^{\frac{\pi}{2}i}$

2 A particle moves in a straight line so that its displacement, x metres, at any time, t seconds, is given by $x = 5\sin 3t + 12\cos 3t$.
What is the speed of the particle as it passes through the centre of its motion?

A. 12 m/s

B. 13 m/s

C. 39 m/s

D. 117 m/s

3 Which of the following is equivalent to the expression $\dfrac{12x-3}{(x-2)(x^2-3x+2)}$?

A. $\dfrac{9}{x-1}-\dfrac{9}{x-2}+\dfrac{21}{(x-2)^2}$

B. $\dfrac{9}{x-1}-\dfrac{18}{x-2}+\dfrac{21}{(x-2)^2}$

C. $\dfrac{9}{x-1}+\dfrac{9}{x-2}-\dfrac{21}{(x-2)^2}$

D. $\dfrac{9}{x-1}+\dfrac{18}{x-2}-\dfrac{21}{(x-2)^2}$

4 Which of the following is the vector equation of a line that passes through the point (1, 3, –2) and is perpendicular to the line $\begin{pmatrix} 2 \\ 1 \\ -2 \end{pmatrix} + \lambda \begin{pmatrix} -1 \\ 2 \\ 1 \end{pmatrix}$?

A. $\begin{pmatrix} 1 \\ 3 \\ -2 \end{pmatrix} + \lambda \begin{pmatrix} 1 \\ -2 \\ -1 \end{pmatrix}$

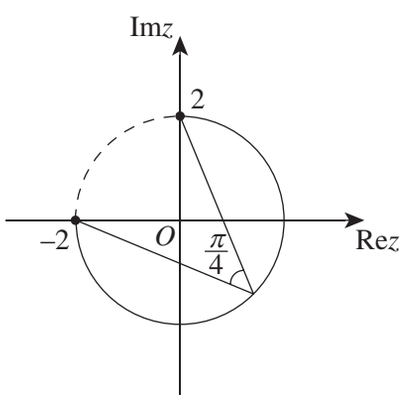
B. $\begin{pmatrix} 2 \\ -2 \\ 1 \end{pmatrix} + \lambda \begin{pmatrix} 1 \\ 3 \\ -2 \end{pmatrix}$

C. $\begin{pmatrix} -1 \\ 0 \\ 2 \end{pmatrix} + \lambda \begin{pmatrix} 2 \\ 3 \\ -4 \end{pmatrix}$

D. $\begin{pmatrix} -1 \\ 0 \\ 2 \end{pmatrix} + \lambda \begin{pmatrix} -1 \\ 1 \\ -3 \end{pmatrix}$

5 Which of the following diagrams best represents the solutions to the equation $\arg\left(\frac{z-2}{z+2i}\right) = \frac{\pi}{4}$?

A.



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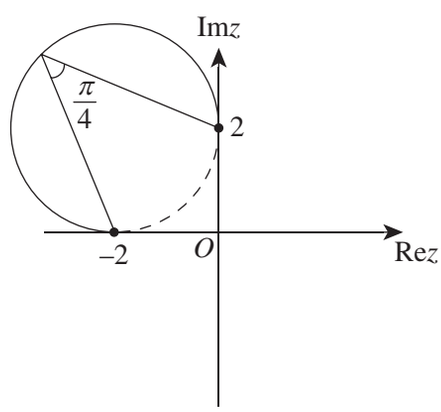
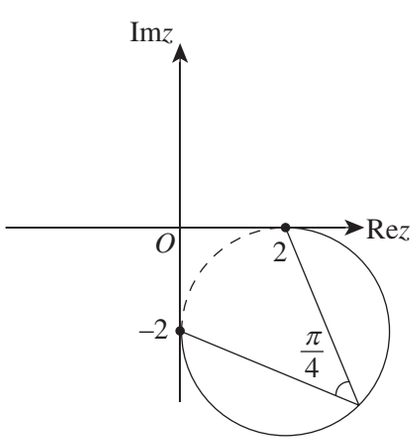
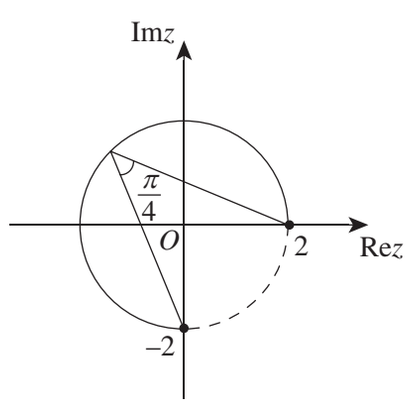


C.



D.



6 The acceleration of a particle is given by $a = e^{-3t}$ m/s^2 where the particle has an initial velocity of 2 m/s^2.

What is the terminal velocity of the particle?

A. 1.33 m/s

B. 1.67 m/s

C. 2.33 m/s

D. 2.67 m/s

7 Which of the following statements is true for lines $L_1 = \begin{pmatrix} 1 \\ -2 \\ 0 \end{pmatrix} + \lambda \begin{pmatrix} 2 \\ 1 \\ 4 \end{pmatrix}$ and $L_2 = \begin{pmatrix} 2 \\ 3 \\ 1 \end{pmatrix} + \mu \begin{pmatrix} -1 \\ 1 \\ -2 \end{pmatrix}$?

A. The lines will intersect, and the angle between the two lines is 2.37 radians.

B. The lines will intersect, and the angle between the two lines is 2.50 radians.

C. The lines will not intersect, and the angle between the two lines is 2.50 radians.

D. The lines will not intersect and, therefore, we cannot conclude what angle the two lines will make with each other.

8 Consider the statement.

'$\exists x \in \mathbb{R},\ \ln x = 1$ and $x > 2$.'

Which of the following is the negation of the statement?

A. $\exists x \in \mathbb{R},\ \ln x \neq 1$ or $x \leq 2$

B. $\exists x \in \mathbb{R},\ \ln x \neq 1$ and $x \leq 2$

C. $\forall x \in \mathbb{R},\ \ln x \neq 1$ or $x \leq 2$

D. $\forall x \in \mathbb{R},\ \ln x \neq 1$ and $x \leq 2$

9 Consider the statement.

'If I have the flu, you also have the flu.'

Which of the following is logically equivalent to the statement?

A. If you have the flu, I also have the flu.

B. If I do not have the flu, you do not have the flu.

C. If you do not have the flu, I do not have the flu.

D. You will have the flu only if I have the flu.

10 Consider the parametric equations.

$$\begin{cases} x = t\sin t \\ y = t\cos t \\ z = t \end{cases}$$

Which of the following best describes the path of a particle with these parametric equations?

A. spiral around the z-axis, traversing in a clockwise direction

B. spiral around the z-axis, traversing in an anticlockwise direction

C. helix around the z-axis, traversing in a clockwise direction

D. helix around the z-axis, traversing in an anticlockwise direction

SECTION II

90 marks
Attempt Questions 11–16
Allow about 2 hours and 45 minutes for this section

Answer each question in a SEPARATE writing booklet. Extra writing booklets are available.

For questions in Section II, your responses should include relevant mathematical reasoning and/or calculations.

Question 11 (15 marks) Use a SEPARATE writing booklet.

(a) Prove $\cos x > 1 - x$ for all $x > 0$. **3**

(b) Find all values of n for which $\left(1 - \sqrt{3}i\right)^n$ is purely imaginary. **3**

(c) The point P represents the complex number $-1 + 5i$. Let point Q be in the first quadrant of an Argand diagram such that $\angle OQP = \dfrac{\pi}{2}$ and $|OQ| = |QP|$. **2**

Find the complex number represented by the point Q.

(d) Find the primitive function of $\dfrac{4x - 1}{x^2 + 2x + 6}$. **3**

(e) A metal ball of unit mass is released from rest into water. After t seconds, its velocity is v m/s and the resistance due to the water is directly proportional to its speed. When the ball is falling at 10 m/s, the resistance is 40 newtons. **4**

Given that $g = 10$ m/s^2, find the velocity of the metal ball as a function of t.

Question 12 (15 marks) Use a SEPARATE writing booklet.

(a) Find α and β given that $z^3 + 6z - 4\sqrt{2}i = (z-\alpha)^2(z-\beta)$. **3**

(b) Consider the statement.

'If x is odd and y is even, then the square of the sum of x and y is also odd.'

(i) Write the converse of the statement. **1**

(ii) Hence, prove that 'the square of the sum of x and y is odd if and only if x is odd and y is even'. **3**

(c) Find $\int x \sin^{-1} x dx$. **4**

(d) Let points $O(0, 0, 0)$, $A(3, 3, 3)$ and $B(6, 0, 0)$ be the vertices of a triangle.

(i) Find the exact value of $\sin \angle AOB$. **2**

(ii) Hence, show that the perpendicular height of vertex A above the base of the triangle, OB, is $3\sqrt{2}$. **2**

Question 13 (15 marks) Use a SEPARATE writing booklet.

(a) Consider the line $L\left(\left(3+t\right)\underset{\sim}{i}+\left(4-2t\right)\underset{\sim}{j}+\left(t-1\right)\underset{\sim}{k}\right)$ and the point $Q(2, 1, 3)$.

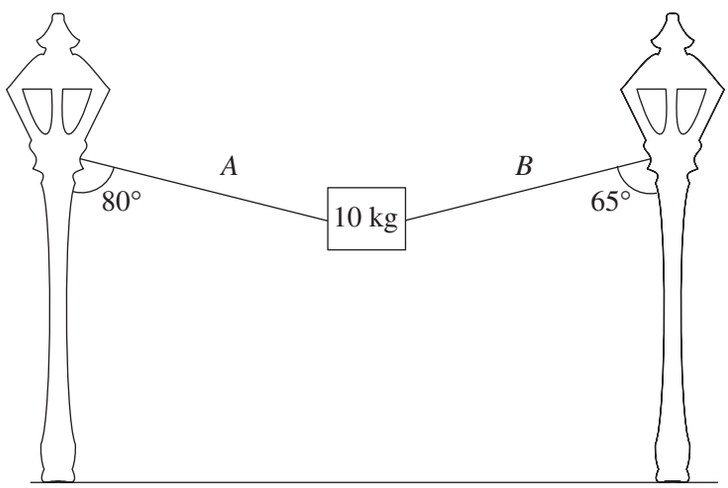
(i) Find the shortest distance between line L and point Q. **3**

(ii) Let point P be the point on line L that is closest to point Q and let point R exist such that points PQR are collinear. **2**

Find the possible coordinates of point R such that $\left|PQ\right|:\left|PR\right|=1:3$.

(b) Evaluate $\int \frac{dx}{1+2\sin x-\cos x}$. **4**

(c) A 10 kg object is suspended above the ground by two strings, A and B, that are tied to two street lamp posts at the same height. The acute angles that the strings make with the lamp posts are 80° and 65° respectively, as shown in the diagram. Let the tensions in string A and string B be T_A and T_B. Let the gravitational acceleration be 10 m/s^2.



(i) Draw a diagram to show all forces acting on the object. **1**

(ii) Find the tension in each string, correct to two decimal places. **2**

(d) A particle moves in a straight line so that, at any time, t, its displacement from the origin is x and its velocity is $\dot{x}$. **3**

If $\ddot{x}=9x^2$ and, when $t=0$, $\dot{x}=-\sqrt{6}$ and $x=1$, find x as a function of t.

Question 14 (15 marks) Use a SEPARATE writing booklet.

(a) Consider $I_n = \int x^m \ln^n x \, dx$.

(i) Show that $I_n = \dfrac{x^{m+1}}{m+1}\ln^n x - \dfrac{n}{m+1} I_{n-1}$. **2**

(ii) Hence, evaluate $\displaystyle\int_1^2 x^3 \ln^4 x \, dx$. **3**

(b) Find the roots of the complex equation $\omega^4 = (\omega - 2)^4$ in the form $a + bi,\ a,\ b \in \mathbb{R}$. **3**

(c) A ball is launched from 1.2 m above ground level with a velocity of $3\underset{\sim}{i} + 4\underset{\sim}{j} + 10\underset{\sim}{k}$ m/s^{-1}.

The deceleration of the ball due to air resistance and gravity is $\underset{\sim}{i} - \underset{\sim}{j} - 2\underset{\sim}{k}$ m/s^{-2}.

(i) Express the velocity of the ball in terms of t. **2**

(ii) Find the time of flight of the ball, correct to two decimal places. **3**

(iii) Find the maximum height of the ball's path. **1**

(iv) Find the maximum horizontal distance travelled by the ball during the flight, correct to two decimal places. **1**

Question 15 (15 marks) Use a SEPARATE writing booklet.

(a) (i) Prove that $a+b \geq 2\sqrt{ab}$. **1**

(ii) Hence, prove that $a^4b^2 + b^4c^2 + c^4a^2 \geq ab^2c^3 + a^2b^3c + a^3bc^2$. **2**

(b) (i) Show that $(1+i\tan\theta)^n + (1-i\tan\theta)^n = \dfrac{2\cos n\theta}{\cos^n\theta}$, where $\cos\theta \neq 0$, $n \in \mathbb{Z}^+$. **2**

(ii) Hence, show that the roots of $(1+z)^2 + (1-z)^2 = 0$ are $z = \pm i\tan\dfrac{\pi}{4}$ when z is purely imaginary. **2**

(c) Prove by mathematical induction that the sum of n terms defined by the recursive formula $T_n = T_{n-1} \times 2a^2b$, where $n > 2$ and $T_1 = a$ is given by $\dfrac{a - 2^n a^{2n+1} b^n}{1 - 2a^2b}$. **4**

(d) Consider points $A(1, 3, 1)$, $B(2, 5, -1)$ and $C(7, 5, -1)$. Line L passes through point B and bisects $\angle ABC$. **2**

Find the vector equation of line L.

(e) Two submarines, A and B, have the position vectors $(-120,\ 210,\ -265)$ and $(100,\ 458,\ -151)$ respectively. Submarine A sets off at 12:00 pm while submarine B sets off at 12:30 pm. The velocity vector for submarine A is $\begin{pmatrix} 30 \\ 45 \\ -10 \end{pmatrix}$ km/h and the velocity vector for submarine B is $\begin{pmatrix} -15 \\ -\frac{9}{2} \\ 13 \end{pmatrix}$ km/h. **2**

Find the time when one submarine will be directly above the other.

Question 16 (15 marks) Use a SEPARATE writing booklet.

(a) Find the integral $\int \sec^3 x dx$. **3**

(b) Consider sphere S, centred at point $C(2, -1, 0)$ with radius $\sqrt{29}$. The line L with parametric equations $\begin{cases} x = \lambda + 1 \\ y = \lambda \\ z = 2\lambda + 3 \end{cases}$ intersects the surface of sphere S at points P and Q.

(i) Find the coordinates of points P and Q. **2**

(ii) A line parallel to line L touches sphere S at a single point, R. **2**
Find the possible coordinates of point R.

(c) Consider the complex numbers $z_1 = \frac{1}{2} + \frac{\sqrt{3}}{2}i$ and $z_2 = i$. **4**

Show that $\frac{z_1 + z_2}{z_1 - z_2} = i \cot \frac{\pi}{12}$.

(d) Consider the graph of the function $f(x) = \frac{x^3 + 1}{x^5 + 1}$. **4**

Using the substitution $u = \frac{1}{x}$, prove that the area under $f(x)$ and between 0 to 1 is half of the area under $f(x)$ and between 0 to ∞.

End of paper

MATHEMATICS ADVANCED
MATHEMATICS EXTENSION 1
MATHEMATICS EXTENSION 2
REFERENCE SHEET

Measurement

Length

$$l = \frac{\theta}{360} \times 2\pi r$$

Area

$$A = \frac{\theta}{360} \times \pi r^2$$

$$A = \frac{h}{2}(a + b)$$

Surface area

$$A = 2\pi r^2 + 2\pi rh$$

$$A = 4\pi r^2$$

Volume

$$V = \frac{1}{3}Ah$$

$$V = \frac{4}{3}\pi r^3$$

Functions

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

For $ax^3 + bx^2 + cx + d = 0$:

$$\alpha + \beta + \gamma = -\frac{b}{a}$$

$$\alpha\beta + \alpha\gamma + \beta\gamma = \frac{c}{a}$$

$$\text{and } \alpha\beta\gamma = -\frac{d}{a}$$

Relations

$$(x - h)^2 + (y - k)^2 = r^2$$

Financial Mathematics

$$A = P(1 + r)^n$$

Sequences and series

$$T_n = a + (n - 1)d$$

$$S_n = \frac{n}{2}\left[2a + (n - 1)d\right] = \frac{n}{2}(a + l)$$

$$T_n = ar^{n-1}$$

$$S_n = \frac{a(1 - r^n)}{1 - r} = \frac{a(r^n - 1)}{r - 1}, \ r \neq 1$$

$$S = \frac{a}{1 - r}, \ |r| < 1$$

Logarithmic and Exponential Functions

$$\log_a a^x = x = a^{\log_a x}$$

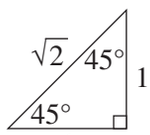
$$\log_a x = \frac{\log_b x}{\log_b a}$$

$$a^x = e^{x \ln a}$$

Trigonometric Functions

$$\sin A = \frac{\text{opp}}{\text{hyp}},\ \cos A = \frac{\text{adj}}{\text{hyp}},\ \tan A = \frac{\text{opp}}{\text{adj}}$$

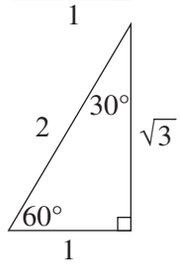
$$A = \frac{1}{2}ab\sin C$$



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$c^2 = a^2 + b^2 - 2ab\cos C$$

$$\cos C = \frac{a^2 + b^2 - c^2}{2ab}$$



$$l = r\theta$$

$$A = \frac{1}{2}r^2\theta$$

Trigonometric identities

$$\sec A = \frac{1}{\cos A},\ \cos A \neq 0$$

$$\text{cosec} A = \frac{1}{\sin A},\ \sin A \neq 0$$

$$\cot A = \frac{\cos A}{\sin A},\ \sin A \neq 0$$

$$\cos^2 x + \sin^2 x = 1$$

Compound angles

$$\sin(A + B) = \sin A\cos B + \cos A\sin B$$

$$\cos(A + B) = \cos A\cos B - \sin A\sin B$$

$$\tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A\tan B}$$

If $t = \tan\frac{A}{2}$ then $\sin A = \frac{2t}{1+t^2}$

$$\cos A = \frac{1-t^2}{1+t^2}$$

$$\tan A = \frac{2t}{1-t^2}$$

$$\cos A\cos B = \frac{1}{2}\left[\cos(A-B) + \cos(A+B)\right]$$

$$\sin A\sin B = \frac{1}{2}\left[\cos(A-B) - \cos(A+B)\right]$$

$$\sin A\cos B = \frac{1}{2}\left[\sin(A+B) + \sin(A-B)\right]$$

$$\cos A\sin B = \frac{1}{2}\left[\sin(A+B) - \sin(A-B)\right]$$

$$\sin^2 nx = \frac{1}{2}(1 - \cos 2nx)$$

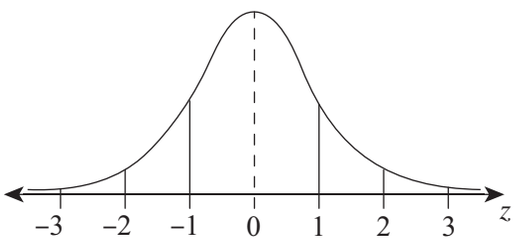
$$\cos^2 nx = \frac{1}{2}(1 + \cos 2nx)$$

Statistical Analysis

$$z = \frac{x - \mu}{\sigma}$$

An outlier is a score
less than $Q_1 - 1.5 \times IQR$
or
more than $Q_3 + 1.5 \times IQR$

Normal distribution



- approximately 68% of scores have z-scores between –1 and 1
- approximately 95% of scores have z-scores between –2 and 2
- approximately 99.7% of scores have z-scores between –3 and 3

$$E(X) = \mu$$

$$\text{Var}(X) = E\left[(X-\mu)^2\right] = E\left(X^2\right) - \mu^2$$

Probability

$$P(A \cap B) = P(A)P(B)$$

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$P(A \mid B) = \frac{P(A \cap B)}{P(B)},\ P(B) \neq 0$$

Continuous random variables

$$P(X \leq r) = \int_a^r f(x)dx$$

$$P(a < X < b) = \int_a^b f(x)dx$$

Binomial distribution

$$P(X = r) = {}^nC_r\, p^r (1-p)^{n-r}$$

$$X \sim \text{Bin}(n, p)$$

$$\Rightarrow P(X = x)$$

$$= \binom{n}{x} p^x (1-p)^{n-x},\ x = 0, 1, \ldots, n$$

$$E(X) = np$$

$$\text{Var}(X) = np(1-p)$$

Differential Calculus

Function	Derivative
$y = f(x)^n$	$\frac{dy}{dx} = nf'(x)\left[f(x)\right]^{n-1}$
$y = uv$	$\frac{dy}{dx} = u\frac{dv}{dx} + v\frac{du}{dx}$
$y = g(u)$ where $u = f(x)$	$\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$
$y = \frac{u}{v}$	$\frac{dy}{dx} = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2}$
$y = \sin f(x)$	$\frac{dy}{dx} = f'(x)\cos f(x)$
$y = \cos f(x)$	$\frac{dy}{dx} = -f'(x)\sin f(x)$
$y = \tan f(x)$	$\frac{dy}{dx} = f'(x)\sec^2 f(x)$
$y = e^{f(x)}$	$\frac{dy}{dx} = f'(x)e^{f(x)}$
$y = \ln f(x)$	$\frac{dy}{dx} = \frac{f'(x)}{f(x)}$
$y = a^{f(x)}$	$\frac{dy}{dx} = (\ln a)f'(x)a^{f(x)}$
$y = \log_a f(x)$	$\frac{dy}{dx} = \frac{f'(x)}{(\ln a)f(x)}$
$y = \sin^{-1} f(x)$	$\frac{dy}{dx} = \frac{f'(x)}{\sqrt{1-\left[f(x)\right]^2}}$
$y = \cos^{-1} f(x)$	$\frac{dy}{dx} = -\frac{f'(x)}{\sqrt{1-\left[f(x)\right]^2}}$
$y = \tan^{-1} f(x)$	$\frac{dy}{dx} = \frac{f'(x)}{1+\left[f(x)\right]^2}$

Integral Calculus

$$\int f'(x)\left[f(x)\right]^n dx = \frac{1}{n+1}\left[f(x)\right]^{n+1} + c \quad \text{where } n \neq -1$$

$$\int f'(x)\sin f(x)dx = -\cos f(x) + c$$

$$\int f'(x)\cos f(x)dx = \sin f(x) + c$$

$$\int f'(x)\sec^2 f(x)dx = \tan f(x) + c$$

$$\int f'(x)e^{f(x)}dx = e^{f(x)} + c$$

$$\int \frac{f'(x)}{f(x)}dx = \ln\left|f(x)\right| + c$$

$$\int f'(x)a^{f(x)}dx = \frac{a^{f(x)}}{\ln a} + c$$

$$\int \frac{f'(x)}{\sqrt{a^2-\left[f(x)\right]^2}}dx = \sin^{-1}\frac{f(x)}{a} + c$$

$$\int \frac{f'(x)}{a^2+\left[f(x)\right]^2}dx = \frac{1}{a}\tan^{-1}\frac{f(x)}{a} + c$$

$$\int u\frac{dv}{dx}dx = uv - \int v\frac{du}{dx}dx$$

$$\int_a^b f(x)dx \approx \frac{b-a}{2n}\left\{f(a)+f(b)+2\left[f\left(x_1\right)+\ldots+f\left(x_{n-1}\right)\right]\right\}$$

where $a = x_0$ and $b = x_n$

Combinatorics

$${}^{n}P_{r} = \frac{n!}{(n-r)!}$$

$$\binom{n}{r} = {}^{n}C_{r} = \frac{n!}{r!(n-r)!}$$

$$(x+a)^{n} = x^{n} + \binom{n}{1}x^{n-1}a + \ldots + \binom{n}{r}x^{n-r}a^{r} + \ldots + a^{n}$$

Vectors

$$\left|\underset{\sim}{u}\right| = \left|x\underset{\sim}{i} + y\underset{\sim}{j}\right| = \sqrt{x^{2}+y^{2}}$$

$$\underset{\sim}{u}\cdot\underset{\sim}{v} = \left|\underset{\sim}{u}\right|\left|\underset{\sim}{v}\right|\cos\theta = x_{1}x_{2} + y_{1}y_{2},$$

where $\underset{\sim}{u} = x_{1}\underset{\sim}{i} + y_{1}\underset{\sim}{j}$

and $\underset{\sim}{v} = x_{2}\underset{\sim}{i} + y_{2}\underset{\sim}{j}$

$$\underset{\sim}{r} = \underset{\sim}{a} + \lambda\underset{\sim}{b}$$

Complex Numbers

$$z = a + ib = r\left(\cos\theta + i\sin\theta\right)$$
$$= re^{i\theta}$$

$$\left[r\left(\cos\theta + i\sin\theta\right)\right]^{n} = r^{n}(\cos n\theta + i\sin n\theta)$$
$$= r^{n}e^{in\theta}$$

Mechanics

$$\frac{d^{2}x}{dt^{2}} = \frac{dv}{dt} = v\frac{dv}{dx} = \frac{d}{dx}\left(\frac{1}{2}v^{2}\right)$$

$$x = a\cos(nt+\alpha) + c$$

$$x = a\sin(nt+\alpha) + c$$

$$\ddot{x} = -n^{2}(x-c)$$

Neap

Trial Examination 2022

HSC Year 12 Mathematics Extension 2

Section II Writing Booklet

Question Number

Student Name/Number: _____

Instructions

Use a separate writing booklet for each question in Section II.

Write the number of this booklet and the total number of booklets that you have used for this question (e.g. 1 of 3)

⇒ [ ] of [ ]

this booklet

number of booklets for this question

Write in black pen.

You may ask for an extra writing booklet if you need more space.

If you have not attempted the question(s), you must still hand in a writing booklet, with 'NOT ATTEMPTED' written clearly on the front cover.

You may NOT take any writing booklets, used or unused, from the examination room.

Students are advised that this is a trial examination only and cannot in any way guarantee the content or the format of the 2022 HSC HSC Year 12 Mathematics Extension 2 examination.

Tick this box if you have continued this answer in another writing booklet. ☐

Trial Examination 2022

HSC Year 12 Mathematics Extension 2

DIRECTIONS:

Write your name in the space provided.
Write your student number in the boxes provided below. Then, in the columns of digits below each box, fill in the oval which has the same number as you have written in the box. Fill in **one** oval only in each column.
Read each question and its suggested answers. Select the alternative A, B, C, or D that best answers the question. Fill in the response oval completely, using blue or black pen. Mark only **one** oval per question.

A ○ B ● C ○ D ○

If you think you have made a mistake, put a cross through the incorrect answer and fill in the new answer.

A ● B ⊗ C ○ D ○

If you change your mind and have crossed out what you consider to be the correct answer, then indicate this by writing the word *correct* and draw an arrow as follows.

correct ↓

A ⊗ B ⊗ C ○ D ○

STUDENT NAME: _____

STUDENT NUMBER:

①	①	①	①	①	①	①	①	①
②	②	②	②	②	②	②	②	②
③	③	③	③	③	③	③	③	③
④	④	④	④	④	④	④	④	④
⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤
⑥	⑥	⑥	⑥	⑥	⑥	⑥	⑥	⑥
⑦	⑦	⑦	⑦	⑦	⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧	⑧	⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨	⑨	⑨	⑨	⑨	⑨
⓪	⓪	⓪	⓪	⓪	⓪	⓪	⓪	⓪

SECTION I

MULTIPLE-CHOICE ANSWER SHEET

1.	A ○	B ○	C ○	D ○
2.	A ○	B ○	C ○	D ○
3.	A ○	B ○	C ○	D ○
4.	A ○	B ○	C ○	D ○
5.	A ○	B ○	C ○	D ○
6.	A ○	B ○	C ○	D ○
7.	A ○	B ○	C ○	D ○
8.	A ○	B ○	C ○	D ○
9.	A ○	B ○	C ○	D ○
10.	A ○	B ○	C ○	D ○

STUDENTS SHOULD NOW CONTINUE WITH SECTION II