GOSFORD HIGH SCHOOL

2016

TRIAL
HIGHER SCHOOL CERTIFICATE EXAMINATION

Mathematics Extension 1

- **General Instructions**
- Reading time – 5 minutes
- Working time – 2 hours
- Write using black or blue pen
  Black pen is preferred
- Board-approved calculators may be used
- A Reference Sheet is provided at the back of this paper
- In Questions 11 – 14, show relevant mathematical reasoning and/or calculations

Total Marks – 70

Section I Pages 2 – 5

10 marks

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

Section II Pages 6 – 12

60 marks

- Attempt Questions 11 – 14
- Allow about 1 hour and 45 minutes for this section

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.

1. What is the value of $\lim_{x \to 0} \frac{\sin 3x}{2x}$

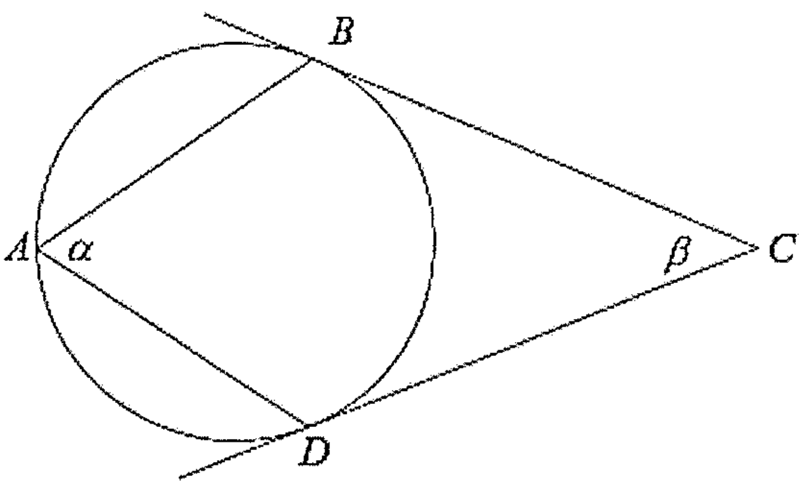
(A) 0

(B) $\frac{2}{3}$

(C) 1

(D) $\frac{3}{2}$

2. In the diagram below, BC and DC are tangents. Which statement is correct?



(A) $\alpha + \beta = 180^\circ$

(B) $2\alpha + \beta = 180^\circ$

(C) $\alpha + 2\beta = 180^\circ$

(D) $2\alpha - \beta = 180^\circ$

3. When the polynomial $P(x) = x^4 + ax + 2$ is divided by $x^2 + 1$ the remainder is $2x + 3$

The value of a is?

(A) 1

(B) 2

(C) 0

(D) 3

4. Which of the following is equal to $4^{\log_2 a}$?

(A) 2a

(B) a^2

(C) a

(D) 4a

5. Evaluate $\frac{\sin A}{\sin A + \cos A} - \frac{\sin A}{\sin A - \cos A} =$

(A) $\cot 2A$

(B) $\operatorname{cosec} 2A$

(C) $\tan 2A$

(D) $\sec 2A$

6. Which of the following is an expression for $\frac{d}{dx}\sin^{-1}(2x-1)$?

(A) $\frac{-1}{\sqrt{x(1-x)}}$

(B) $\frac{-1}{2\sqrt{x(1-x)}}$

(C) $\frac{1}{2\sqrt{x(1-x)}}$

(D) $\frac{1}{\sqrt{x(1-x)}}$

7. Find $\int \frac{1}{9+25x^2}\,dx$.

(A) $\frac{1}{15}\tan^{-1}\frac{5x}{3} + C$

(B) $\frac{1}{25}\tan^{-1}\frac{5x}{3} + C$

(C) $\frac{1}{25}\tan^{-1}\frac{3x}{5} + C$

(D) $\frac{1}{15}\tan^{-1}\frac{3x}{5} + C$

8. A particle is oscillating in Simple Harmonic Motion where its position x metres from a fixed point O on the same line as its motion after t seconds is given by $x = 2\cos\left(3t + \frac{\pi}{6}\right)$. What is the maximum speed of the particle?

(A) 2 m/s

(B) 6 m/s

(C) 0 m/s

(D) $\frac{\pi}{9}$ m/s

9. The solution to $|2x-1| \le |x-2|$ is

(A) $x \le 1$

(B) $x \ge 1$

(C) $-1 \le x \le 1$

(D) $x \le -1$ or $x \ge 1$

10. A metal disc of 5 cm radius expands when heated. If the radius is increasing at a rate of 0.02 cm/sec, the rate at which the area of one of the faces is increasing is given by:

(A) $\frac{\pi}{10}$ cm^2/sec

(B) $\frac{\pi}{5}$ cm^2/sec

(C) $\frac{2\pi}{5}$ cm^2/sec

(D) $\frac{5\pi}{2}$ cm^2/sec

Section II

60 marks

Attempt Questions 11 – 14.

Allow about 1 hour and 45 minutes for this section.

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

In Questions 11 – 14, your responses should include relevant mathematical reasoning and/or calculations.

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

(a) Solve the inequality $\frac{3x-2}{x+1} > 2$ **2**

(b) $M(-1,7)$ and $N(3,1)$ are two points. If point $L(-5,2)$ divides the interval MN externally in the ratio $k:1$, find the value of k. **2**

(c) Find $\int \frac{1+6x}{1+x^2}dx$ **2**

(d) The two curves $y=x^3$ and $y=2-x^2$ intersect at (1,1).
Find the acute angle between the two curves at (1,1). **3**

(e) Use Mathematical Induction to show that for all positive integers n **3**

$$1^2+3^2+5^2+7^2+\ldots+(2n-1)^2=\frac{n}{3}(2n-1)(2n+1)$$

(f) Use the substitution $u=x^3-1$ to evaluate $\int_0^2 \frac{x^2}{(x^3-1)^2}dx$. **3**

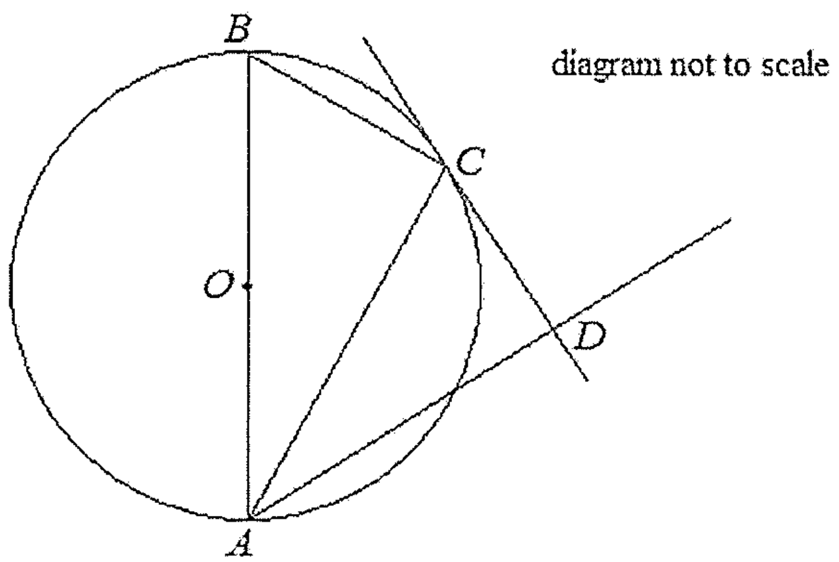
End of Question 11.

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

(a) The three numbers $a,\ b,\ c$ are consecutive terms in an arithmetic progression. **2**

Show that the three numbers $e^a,\ e^b,\ e^c$ are consecutive terms in a geometric progression.

(b) **3**



In the diagram AOB is the diameter of a circle centre O, and C is the point of contact of the tangent DC such that AC bisects $\angle DAB$.

Copy this diagram into your booklet.

Prove that AD is perpendicular to DC.

(c) The polynomials $P(x)$ and $Q(x)$ are such that $P(x)=(x^2-1)Q(x)+ax+b$ for some constants a and b. $(x+1)$ is a factor of $P(x)$ and when $P(x)$ is divided by $(x-1)$ the remainder is 2. Find the remainder when $P(x)$ is divided by (x^2-1). **3**

Question 12 continues on page 8.

Question 12 continued

(d) Find the exact area between the curve $y = \sin^{-1} x$, the x-axis and the lines $x = \frac{1}{2}$ and $x = 1$. **3**

(e) Find the equation of the vertical and horizontal asymptotes of the curve $y = \frac{2x^2+1}{x^2-4x}$ **2**

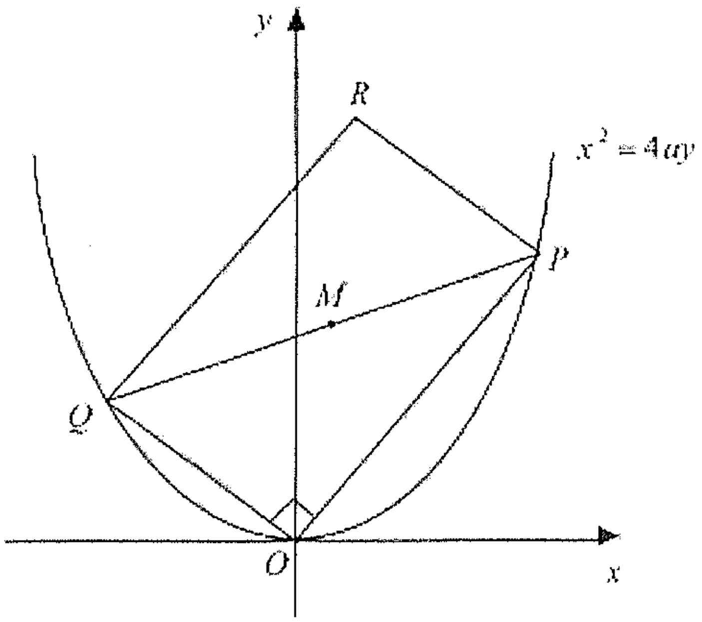
(f) For what values of x will $1 - \tan^2 x + \tan^4 x - \tan^6 x + \ldots$ have a limiting sum for $0 \le x \le 2\pi$? **2**

End of Question 12.

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

(a) Show that $\int_{\frac{\pi}{4}}^{\frac{\pi}{3}} \sin^2 3x\, dx = \frac{1}{2}\left(\frac{\pi}{12} - \frac{1}{6}\right)$ **3**

(b)



$P(2ap, ap^2)$ and $Q(2aq, aq^2)$ are two points which move on the parabola $x^2 = 4ay$ such that $\angle POQ = 90^\circ$, where O is the origin.

$M = \left(a(p+q), \frac{1}{2}a(p^2+q^2)\right)$ is the midpoint of PQ. R is the point such that $OPRQ$ is a rectangle.

(i) Show that $pq = -4$ **1**

(ii) Show that R has coordinates $\left(2a(p+q), a(p^2+q^2)\right)$. **1**

(iii) Find the equation of the locus of R. **2**

Question 13 continues on page 10.

(c) The acceleration of a particle is given by $\ddot{x} = 4(x+1)$ ms^{-2}. Initially, the particle is at the origin and velocity is 2 ms^{-1}.

(i) Show that the velocity, v, at any position, x, is given by $v = 2x + 2$. **2**

(ii) Hence show that $x = e^{2t} - 1$. **2**

(d) (i) Show that $e^x + x = 3$ has a root between $x = 0$ and $x = 1$. **2**

(ii) By taking $x = 0.8$ as an approximate solution, use one application of Newton's Method to find a better approximation, correct to 3 significant figures. **2**

End of Question 13.

Question 14 (15 marks) Use a new writing booklet

(a) The depth of water y metres in a tidal creek is given by $y = 5 - 4\cos\frac{t}{2}$, for $0 \le t \le 4\pi$.

The time, t, being measured in hours.

(i) Draw a neat sketch of $y = 5 - 4\cos\frac{t}{2}$, showing all important features **2**

(ii) If the low tide one day is at 1.00 p.m., when is the earliest time that a ship requiring 3 m of water can enter the creek? Give your answer to the nearest minute. **2**

(b) At time t years the number, N of individuals in a population is given by $N = 500 - 400e^{-0.1t}$.

(i) Show that $\frac{dN}{dt} = -0.1(N - 500)$. **1**

(ii) Find the population size for which the rate of growth of the population is half the initial rate of growth. **2**

(c) A group of 10 people, consisting of 6 girls and 4 boys, decided to go to the movies where they sit together in the same row.

(i) How many ways can the 10 people be seated in a row? **1**

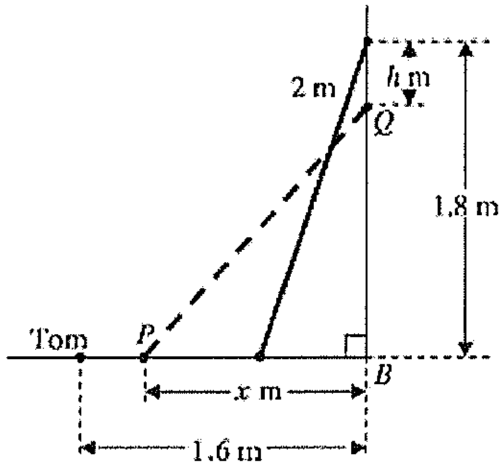
(ii) How many different arrangements of seating are possible where the 4 boys are all seated together? **2**

(iii) How many ways can at least one of the boys be separated from the other boys? **1**

Question 14 continues on page 12.

Question 14 continued

(d) The diagram shows a ladder PQ, 2 metres in length, leaning against a wall such that the top of the ladder, Q, initially reaches 1.8 metres up the wall. The base of the ladder, P, is x metres from the base of the wall, B.



NOT TO SCALE

The ladder begins to slide down the wall at the rate of 0.5 metres per minute such that the top of the ladder is h metres below its original position after t minutes.

(i) Show that t minutes after the ladder begins to slide down the wall, $h = 1.8 - \sqrt{4 - x^2}$. **1**

(ii) Tom is standing on the ground 1.6 metres from the base of the wall in a direct line with the ladder. **3**

At what rate does the base of the ladder hit Tom?

End of Exam.

Extn 1

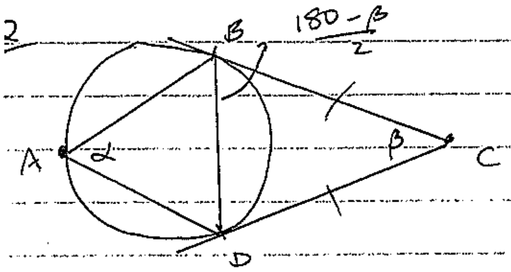
1 $\lim_{x\to 0} \frac{\sin 3x}{2x}$

$= \lim_{x\to 0} \frac{\sin 3x}{3x \times \frac{2}{3}}$

$= \frac{3}{2} \lim_{x\to 0} \frac{\sin 3x}{3x}$

$= \frac{3}{2}$ (D)

2



$\alpha = \frac{180-\beta}{2}$ (∠ in alternate segment)

$\therefore 2\alpha + \beta = 180$

(B)

3

$P(x) = (x^2+1)Q(x) + (2x+3)$

& $Q(x) = (x^2+bx+c)$

$c+1=0 \quad \therefore c=-1$

$b+2=a \qquad b=0$

$\therefore a = 2$ (B)

4 $4^{\log_2 a}$

$= (2^2)^{\log_2 a}$

$= 2^{\log_2 a^2}$

$= a^2$ (B)

5 LHS $= \frac{\sin^2 A - \sin A\cos A - \sin^2 A - \sin A \cos A}{\sin^2 A - \cos^2 A}$

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

$= \frac{-(\sin 2A)}{-(\cos 2A)}$

$= \tan 2A$ (C)

6 $\frac{d}{dx} \sin^{-1}(2x-1)$

let $u = 2x-1$

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

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

$y = \sin^{-1} u$

$\frac{dy}{du} = \frac{1}{\sqrt{1-u^2}}$

$= \frac{2}{\sqrt{1-(2x-1)^2}}$

$= \frac{2}{\sqrt{1-4x^2+4x-1}}$

$= \frac{2}{\sqrt{4x(1-x)}}$

$= \frac{2}{2\sqrt{x(1-x)}}$

$= \frac{1}{\sqrt{x(1-x)}}$ (D)

7 $\int \frac{1}{25\left(x^2+\frac{9}{25}\right)}\,dx$

$= \frac{1}{25} \times \frac{5}{3} \tan^{-1}\frac{5x}{3} + c$

$= \frac{1}{15}\tan^{-1}\frac{5x}{3} + c$ (A)

8 $x = 2\cos\left(3t+\frac{\pi}{6}\right)$

max speed at $x=0$

$\therefore 3t + \frac{\pi}{6} = \frac{\pi}{2}$

$3t = \frac{\pi}{3}$

$t = \frac{\pi}{9}$

(B)

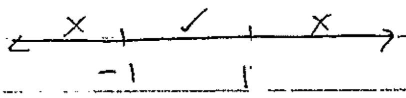
$\dot{x} = -6\sin\left(3t+\frac{\pi}{6}\right)$

speed $= \left|-6\sin\left(\frac{\pi}{3}+\frac{\pi}{6}\right)\right| = 6$ m/s

9 $|2x-1| \le |x-2|$

C.P

$x < \frac{1}{2}$	$\frac{1}{2} < x < 2$	$x > 2$
$-2x+1 = -x+2$	$2x-1 = -x+2$	$2x-1 = x-2$
$-x = 1$	$3x = 3$	$x = -1$
$x = -1$	$x = 1$	✗



$x = -2 \quad 5 \le +4$ ✗

$x = 0 \quad 1 \le 2$ ✓

$x = 2 \quad 3 \le 0$ ✗

$-1 \le x \le 1$ (C)

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0 $\frac{dr}{dt} = 0.02 \qquad \frac{dA}{dt} = ?$

$A = \pi r^2$

$\frac{dA}{dr} = 2\pi r \qquad \frac{dA}{dt} = \frac{dA}{dr} \times \frac{dr}{dt}$

$= 2\pi r \times 0.02$

at $r = 5$

$\frac{dA}{dt} = 2 \times \pi \times 5 \times 0.02$

$= \frac{\pi}{5}$ cm^2/sec (B)

a) $\dfrac{3x-2}{x+1} > 2$

C.P at

$x = -1$

$3x - 2 = 2x + 2$

$x = 4$

✓   -1   ×   4   ✓

$x = -2 \qquad \frac{-8}{-1} > 2$ ✓

$x = 0 \qquad \frac{-2}{1} > 2$ ×

$x = 5 \qquad \frac{13}{6} > 2$ ✓

$x < -1 \ , \ x > 4$ 1   1   (2)

b) $m(-1,7) \quad n(3,1)$

$k : -1$ 1

$(-5, 2)$

$-5 = \dfrac{3k+1}{k-1}$

$-5k + 5 = 3k + 1$

$4 = 8k$

$k = \frac{1}{2}$ 1   (2)

c) $\displaystyle\int \frac{1+6x}{1+x^2}\,dx$

$= \displaystyle\int \left(\frac{1}{1+x^2} + \frac{6x}{1+x^2} \right) dx$

$= \tan^{-1} x + 3\ln(1+x^2) + c$ 1   1   (2)

d) $y = x^3 \qquad y = 2 - x^2$

$y' = 3x^2 \qquad y' = -2x$

$m_1 = 3$ 1 $\qquad m_2 = -2$ 1

$\tan \alpha = \left| \dfrac{3+2}{1-6} \right|$

$= |1|$

$\therefore \alpha = 45^\circ$ 1   (3)

e) Prove

$1^2 + 3^2 + \ldots + (2n-1)^2 = \frac{n}{3}(2n-1)(2n+1)$

Prove $n = 1$

LHS $= 1^2 = 1$ $\qquad$ RHS $= \frac{1}{3}(2-1)(2+1) = 1$

$\therefore$ LHS = RHS

$\therefore$ true $n = 1$ 1

Assume true $n = k$ k is +ve integer

ie

$1^2 + 3^2 \ldots + (2k-1)^2 = \frac{k}{3}(2k-1)(2k+1)$

Prove true $n = k+1$

LHS $= 1^2 + 3^2 \ldots + (2k-1)^2 + (2(k+1)-1)^2$

$= \frac{k}{3}(2k-1)(2k+1) + (2k+2-1)^2$ 1

$= \frac{k}{3}(2k-1)(2k+1) + (2k+1)^2$

$= (2k+1)\left[\frac{k}{3}(2k-1) + (2k+1)\right]$

$= (2k+1)\left(\frac{2k^2}{3} - \frac{k}{3} + 2k + 1\right)$

$= \frac{1}{3}(2k+1)(2k^2 - k + 6k + 3)$

$= \frac{1}{3}(2k+1)(2k^2 + 5k + 3)$

$= \frac{1}{3}(2k+1)(2k+3)(k+1)$ 1

$= \frac{k+1}{3}(2(k+1)-1)(2(k+1)+1)$

$\therefore$ true $n = k+1$ (3)

$\therefore$ true ...

f) $\int_0^2 \frac{x^2}{(x^3-1)^2}\,dx$ $\quad u = x^3 - 1$

$\frac{du}{dx} = 3x^2$

$x=2 \quad u=7$ 1

$x=0 \quad u=-1$

$\frac{1}{3}\int_{-1}^{7} \frac{1}{u^2}\,du$

$= \frac{1}{3}\int_{-1}^{7} u^{-2}\,du$

$= -\frac{1}{3}\left[u^{-1}\right]_{-1}^{7}$ 1

$= -\frac{1}{3}\left(\frac{1}{7}+1\right)$

$= \frac{-8}{21}$ 1

(3)

Q12

a) $b-a = c-b = d$ 1

$\therefore \frac{e^b}{e^a} = e^{b-a}$

$= e^{c-b}$ (from above)

$= \frac{e^c}{e^b}$ 1

$= r$

$\therefore e^a, e^b, e^c$ are in G.P. (2)

b) $\angle ACB = 90^\circ$ ($\angle$ in semi-circle)

$\angle BAC = \angle CAD$ (given AC bisects $\angle DAB$)

$\angle DCA = \angle CBA$ ($\angle$ in alternate segment)

$\therefore \triangle ABC \equiv \triangle ACD$ (equiangular)

$\therefore \angle ADC = \angle ACB = 90^\circ$ (corresponding $\angle$'s in similar $\triangle$'s) 1

(3)

c) $P(x) = (x^2-1)\,Q(x) + ax + b$

$P(-1) = 0 \qquad P(1) = 2$

$\therefore -a + b = 0$ 1

$a + b = 2$ 1

$2b = 2$

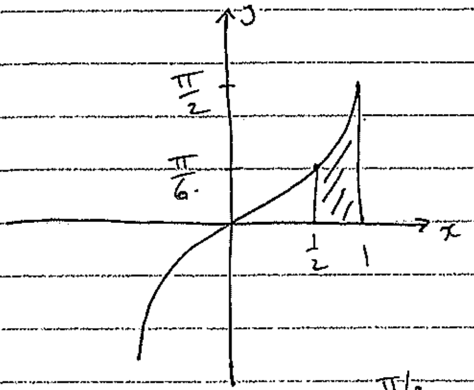
$b = 1$

$a = 1$

$\therefore$ Remainder $= x + 1$ 1

(3)

d)



$$\text{Area} = \frac{\pi}{2} - \frac{\pi}{6} \times \frac{1}{2} - \int_{\pi/6}^{\pi/2} \sin y \, dy$$

$$= \frac{\pi}{2} - \frac{\pi}{12} + \Big[\cos y\Big]_{\pi/6}^{\pi/2}$$

$$= \frac{5\pi}{12} + \left(0 - \frac{\sqrt{3}}{2}\right)$$

$$= \frac{5\pi - 6\sqrt{3}}{12} \ u^2$$

(3)

b) $y = \dfrac{2x^2+1}{x^2-4x}$

vert. asympt at

$x(x-4) = 0$

$x = 0, \ x = 4$

horiz asympt. at

$$= \lim_{x \to \infty} \frac{\frac{2x^2}{x^2} + \frac{1}{x^2}}{\frac{x^2}{x^2} - \frac{4x}{x^2}}$$

$y = 2$

(2)

e) $1 - \tan^2 x + \tan^4 x \ldots$

limiting sum if $|r| < 1$

$\therefore \left|-\tan^2 x\right| < 1$

$-1 < \tan x < 1$

$-\frac{\pi}{4} < x < \frac{\pi}{4}$ but $0 \le x \le 2\pi$

$0 \le x < \frac{\pi}{4}$, $\frac{3\pi}{4} < x < \frac{5\pi}{4}$, $\frac{7\pi}{4} < x \le$ …

↑ any 1

(2)

13

a) $\text{LHS} = \displaystyle\int_{\pi/4}^{\pi/3} \sin^2 3x \, dx$

$\cos 6x = 1 - 2\sin^2 3x$

$\sin^2 3x = \frac{1}{2} - \frac{1}{2}\cos 6$…

$$= \frac{1}{2}\int_{\pi/4}^{\pi/3} (1 - \cos 6x)\, dx$$

$$= \frac{1}{2}\left[x - \frac{\sin 6x}{6}\right]_{\pi/4}^{\pi/3}$$

$$= \frac{1}{2}\left(\frac{\pi}{3} - \frac{\sin 2\pi}{6} - \frac{\pi}{4} + \frac{\sin\frac{3\pi}{2}}{6}\right)$$

$$= \frac{1}{2}\left(\frac{\pi}{3} - \frac{\pi}{4} - \frac{1}{6}\right)$$

$$= \frac{1}{2}\left(\frac{\pi - 2}{12}\right)$$

(3)

b) $OQ: \ m = \dfrac{aq^2}{2aq}$ $\quad OP: \ m_2 = \dfrac{p}{2}$

$m_1 = \dfrac{q}{2}$

& $m_1 m_2 = -1$

$\therefore OQ \perp OP$

$\therefore \dfrac{q}{2} \times \dfrac{p}{2} = -1$

$\therefore pq = -4$

(1)

i) m is midpoint of OR

(diagonals of rectangle bisect each other)

$R(x, y)$

$\therefore a(p+q) = \frac{x+0}{2}$ (1)

$\therefore x = 2a(p+q)$

$\frac{1}{2}a(p^2+q^2) = \frac{y+0}{2}$

$\therefore y = a(p^2+q^2)$

$\therefore R\left(2a(p+q),\ a(p^2+q^2)\right)$

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i) $p+q = \frac{x}{2a}$

& $y = a\left((p+q)^2 - 2pq\right)$ (1)

$= a\left(\frac{x^2}{4a^2} - 2(-4)\right)$

$= a\left(\frac{x^2}{4a^2} + 8\right)$ 1

$= \frac{x^2}{4a} + 8a$

$x^2 = 4a(y-8a)$ (2)

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c) $\ddot{x} = 4(x+1)$

at $t=0,\ x=0,\ v=2$

i) $\frac{d}{dx}\left(\frac{1}{2}v^2\right) = 4x+4$

$\frac{1}{2}v^2 = 2x^2+4x+c$ 1

at $x=0\ v=2 \quad \therefore c=2$

$v^2 = 4x^2+8x+4$

$v^2 = 4(x^2+2x+1)$

$= 4(x+1)^2$

$\therefore v = \sqrt{4(x+1)^2}$ 1

$v = 2(x+1)$ (2)

---

ii) $\therefore \frac{dx}{dt} = 2(x+1)$

$\frac{dt}{dx} = \frac{1}{2(x+1)}$

$\therefore t = \frac{1}{2}\int \frac{1}{x+1}\,dx$

$t = \frac{1}{2}\ln(x+1) + c$ 1

at $t=0\ x=0$

$\therefore 0 = \frac{1}{2}\ln 1 + c \quad \therefore c=0$

$\therefore t = \frac{1}{2}\ln(x+1)$

$2t = \ln(x+1)$

$e^{2t} = x+1$

$x = e^{2t}-1$ 1 (2)

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d) i) $f(x) = e^x + x - 3$

$f(0) = e^0 + 0 - 3$

$= 1-3$

$= -2 < 0$ 1

$f(1) = e+1-3$

$= e-2 > 0$ 1

$\therefore f(0)<0,\ f(1)>0$

$\therefore$ root lies between

$x=0$ & $x=1$

(2)

i) $a = 0.8$

$f(x) = e^x + x - 3$ 1

$f'(x) = e^x + 1$

$f(0.8) = e^{0.8} - 2.2$

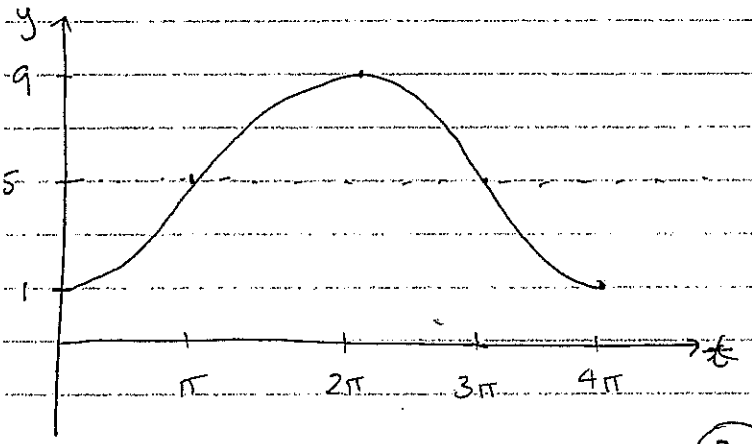
$f'(0.8) = e^{0.8} + 1$

$a = 0.8 - \dfrac{e^{0.8} - 2.2}{e^{0.8} + 1}$ 1

$a = 0.792$ (3 s.f.) (2)

4

a) i) $y = 5 - 4\cos\frac{t}{2}$



(2)

ii) $3 = 5 - 4\cos\frac{t}{2}$

$\cos\frac{t}{2} = \frac{1}{2}$ 1

$\therefore \frac{t}{2} = \frac{\pi}{3}$

$t = \frac{2\pi}{3}$ h

$\doteq 2.09$ h

∴ earliest time at 3:06 pm 1
(nearest minute)

(2)

b) $N = 500 - 400e^{-0.1t}$

i) $\frac{dN}{dt} = -400 \times -0.1e^{-0.1t}$

$= -0.1(-400e^{-0.1t})$

$= -0.1(500 - 400e^{-0.1t} - 500)$

$= -0.1(N - 500)$ (1)

ii) at $t = 0$

$\frac{dN}{dt} = 40$

$\therefore \frac{dN}{dt} = 20$ 1

$20 = -0.1(N - 500)$

$N = 300$ 1 (2)

c) i) $10! = 3628800$ (1)

ii) $7! \times 4! = 120960$ (2)

iii) $3628800 - 120960 = 3507840$ (1)

d) i) $(1.8 - h)^2 + x^2 = 2^2$

$(1.8 - h)^2 = 4 - x^2$

$1.8 - h = \sqrt{4 - x^2}$

$h = 1.8 - \sqrt{4 - x^2}$ (1)

ii) at $x = 1.6$m

$\frac{dh}{dx} = -\frac{1}{2}(4 - x^2)^{-1/2} \times -2x$

$= \frac{x}{\sqrt{4 - x^2}}$ 1

$\frac{dh}{dt} = 0.5$

$\therefore \frac{dx}{dt} = \frac{dx}{dh} \times \frac{dh}{dt}$ at $x = 1.6$

$\frac{dx}{dt} = \frac{\sqrt{4-x^2}}{x} \times 0.5$ 1/

$= \frac{\sqrt{4-1.6^2}}{1.6} \times 0.5$

$= 0.375$ m/s 1/

(3)