



KILLARA HIGH SCHOOL

YEAR 11 MATHEMATICS

TERM 4 EXAMINATION - DECEMBER, 2003

Time Allowed: 1 hour

Total Marks: 65 marks

Instructions:

Attempt all questions.

Approved calculators may be used.

Show all necessary working clearly. Answers without appropriate working may not be awarded marks.

Marks may be deducted for untidy or poorly set out work.

Write solutions on one side of your paper only, using black or blue pen.

Begin each question on a new page.

SECTION A:**CALCULUS and APPLICATIONS****(33 marks)****Marks**

1. Differentiate:

i) $y = \frac{x}{2}$

1

ii) $y = \frac{2}{x}$

1

iii) $y = \frac{2}{x^2} + 1$

1

iv) $y = 4x^3 - 2\sqrt{x} - 1$

2

v) $y = \sqrt[3]{x^3 - 2}$

3

vi) $y = x\sqrt{2x+1}$

2

vii) $y = \frac{x}{(x+2)^2}$

3

viii) $y = \frac{(2x+3)(2x-3)}{x}$

32. A tangent is drawn to the curve $y = (x^2 - 4)(x^4 + 3)$ at the point where $x = 1$ on it.

i) What angle does this tangent make, to the nearest minute, with the positive end of the x-axis?

3

ii) Find the equation of the tangent.

3

ii) At what point does the tangent cut the x-axis

1

3. For the function $y = 6x^2 - 9x - x^3 - 1$

i) Find the stationary points and determine their nature, within the domain $0 \leq x \leq 5$.

5

ii) Find the absolute maximum and minimum values for the given domain.

2

iii) Draw a neat sketch of the function for the given domain.

3

SECTION B: **SEQUENCES AND SERIES** **(32 marks)**

1. For the following sequences, find the required term:

i) 3, 8, 13, ... T_8 3

ii) 3, -15, 75, ... T_5 3

iii) $2\frac{1}{4}$, 3, $3\frac{3}{4}$, ... T_5 3

iv) a^2b , a , b^{-1} , ... T_6 3

2. Which term of the sequence $3, 4\frac{1}{2}, 6, \dots$ is equal to 24 ? 3
3. In an Arithmetic Sequence, three times the third term is one less than the sum of the fourth and fifth terms. Also, the sixth term is one more than eight times the first term.
Find the sequence. 4
4. Find x if $(x - 2)$, $(x + 1)$ and $(2x + 2)$ are the first three terms of a geometric sequence. 3
5. The limiting sum of a Geometric series is 64, and its first term is 80.
Find the value of its ratio " r ". 3
6. Evaluate $\sum_{n=0}^5 3(2^n)$ 2
7. A woman invests \$3 000 into a superannuation fund at the beginning of each year. This will accumulate interest of 9.8% p.a., compounded six monthly.
- i) What will her investment be worth at the end of 25 years? 4
- ii) What is the total amount of interest earned over this period? 1

END OF PAPER

SOLUTIONS

MATHEMATICS TERM 4, 2003

SECTION A.

i) $y = \frac{x}{2}$

$\frac{dy}{dx} = \frac{1}{2}$ ✓

ii) $y = \frac{x}{2}$

$\frac{dy}{dx} = \frac{1}{2}$ ✓

$\frac{dy}{dx} = -\frac{2}{x^2}$

$\frac{dy}{dx} = -\frac{2}{x^2}$ ✓

iii) $y = \frac{x}{2} + 1$

$\frac{dy}{dx} = \frac{1}{2}$ ✓

iv) $y = 4x^3 - 2\sqrt{x} - 1$

$\frac{dy}{dx} = 12x^2 - \frac{1}{\sqrt{x}}$ ✓

v) $y = \sqrt[3]{x^3 - 2}$

$\frac{dy}{dx} = \frac{1}{3}(x^3 - 2)^{-\frac{2}{3}}(3x^2)$ ✓

$\frac{dy}{dx} = \frac{x^2}{\sqrt[3]{(x^3 - 2)^2}}$ ✓

vi) $y = x\sqrt{2x+1}$

$\frac{dy}{dx} = \sqrt{2x+1} + \frac{x}{\sqrt{2x+1}}$ ✓

$\frac{dy}{dx} = \frac{2x+1+x}{\sqrt{2x+1}}$ ✓

$\frac{dy}{dx} = \frac{3x+1}{\sqrt{2x+1}}$ ✓

$\frac{dy}{dx} = \frac{3x+1}{\sqrt{2x+1}}$ ✓

vii) $y = \frac{x}{(x+2)^2}$

$\frac{dy}{dx} = \frac{1}{(x+2)^3}$

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viii) $y = \frac{(2x+3)(2x-3)}{x}$

$\frac{dy}{dx} = \frac{4x^2 - 9}{x^2}$ ✓

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② $y = (x^2 - 4)(x^4 + 3)$

$\frac{dy}{dx} = (2x)(x^4 + 3) + (x^2 - 4)(4x^3)$

$\frac{dy}{dx} = 2x^5 + 6x + 4x^5 - 16x^3$ ✓

$\frac{dy}{dx} = 6x^5 + 6x - 16x^3$ ✓

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$\frac{dy}{dx} = 6x^5 + 6x - 16x^3$ ✓

$\frac{dy}{dx} = 6x^5 + 6x - 16x^3$ ✓

③ $y = 6x^2 - 9x - x^3$

$\frac{dy}{dx} = 12x - 9 - 3x^2$

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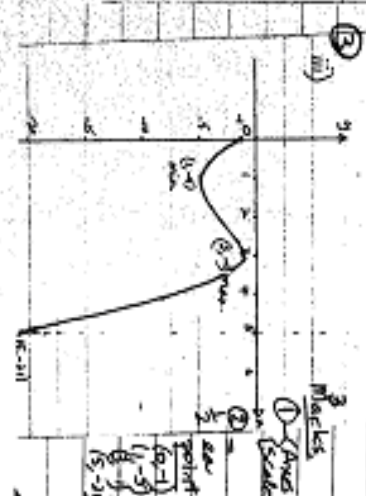
$\frac{dy}{dx} = 12x - 9 - 3x^2$ ✓

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iii) $\frac{dy}{dx} = 12x - 9 - 3x^2$

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v) $\frac{dy}{dx} = 12x - 9 - 3x^2$

vi) $\frac{dy}{dx} = 12x - 9 - 3x^2$

vii) $\frac{dy}{dx} = 12x - 9 - 3x^2$

viii) $\frac{dy}{dx} = 12x - 9 - 3x^2$

ix) $\frac{dy}{dx} = 12x - 9 - 3x^2$

x) $\frac{dy}{dx} = 12x - 9 - 3x^2$

xi) $\frac{dy}{dx} = 12x - 9 - 3x^2$

xii) $\frac{dy}{dx} = 12x - 9 - 3x^2$

xiii) $\frac{dy}{dx} = 12x - 9 - 3x^2$

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xx) $\frac{dy}{dx} = 12x - 9 - 3x^2$

xxi) $\frac{dy}{dx} = 12x - 9 - 3x^2$

xxii) $\frac{dy}{dx} = 12x - 9 - 3x^2$

xxiii) $\frac{dy}{dx} = 12x - 9 - 3x^2$

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xxviii) $\frac{dy}{dx} = 12x - 9 - 3x^2$

xxix) $\frac{dy}{dx} = 12x - 9 - 3x^2$

xxx) $\frac{dy}{dx} = 12x - 9 - 3x^2$

