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RANDWICK BOYS' HIGH SCHOOL

MATHEMATICS DEPARTMENT
2 Unit Mathematics
Component B
Assessment Task
Year Twelve

29 June 2001

Examiner: J Dimopoulos

ime Allowed: 45 Minutes

nstructions for tudents:

* Candidates may attempt all questions
* All necessary working should be shown in every question
* Full marks may not be awarded for careless or badly arranged work
* Some formulae have been given at the end of the paper

Vrite your name on every page of your answers

Student's Name: ____________________

Mathematics Class: ____________________

THIS IS AN ASSESSMENT TASK

QUESTION 1 **(5 Marks)**

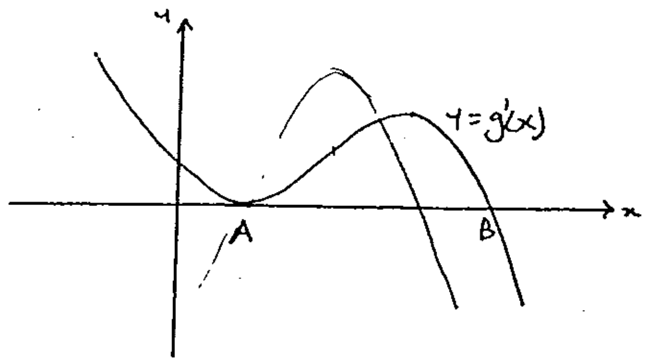
Consider the function $f(x) = 3x^2 - 2x + 1$

(i) Find the gradient of the chord joining the points whose x - coordinates are 1 and $(1 + L)$ respectively

(ii) Hence determine the gradient of the tangent to the curve at $x = 1$

QUESTION 2 **(6 Marks)**

The graph shows the gradient (ie derivative) function of $y = g(x)$



(i) $y = g(x)$ has stationary points at both $x = A$ and $x = B$. What types of stationary points are they? Explain!

(ii) The point $(0,0)$ is on $y = g(x)$. Copy the graph of $y = g^1(x)$ and show the graph of $y = g(x)$ on the same axis as $y = g^1(x)$

QUESTION 3 **(3 Marks)**

If $y^2 = x$, for $y \geq 0$, show by means of sketching the graphs and <u>not</u> by means of evaluating definite integrals, that

$$\int_0^1 x\,dy = 1 - \int_0^1 y\,dx$$

SOLUTIONS

QUESTION 1

$y = 3x^2 - 2x + 1$

$f(1) = 3\times1^2 - 2\times1 + 1$

$f(1) = 2$

$f(1+h) = 3(1+h)^2 - 2(1+h) + 1$

$= 3(1+2h+h^2) - 2 + 2h + 1$

$= 3 + 6h + h^2 - 2 + 2h + 1$

$= 2 + 4h + 3h^2$

Grad. of Chord $= \dfrac{y_2 - y_1}{x_2 - x_1}$ ✓

$= \dfrac{f(1+h) - f(1)}{(1+h) - 1}$ ✓

$= \dfrac{(2 + 4h + 3h^2) - 2}{h}$ ✓

$= \dfrac{4h - 3h^2}{h}$

$= 4 + 3h$ ✓

Grad. of tangent $= \lim_{h \to 0} (4 + 3h)$ ✓

$= 4$

QUESTION 2

(i) At $x = A$ Horizontal Inflexion point occurs ✓

as $g'(A) = 0$ and

$g'(x)$ does not change signs ✓

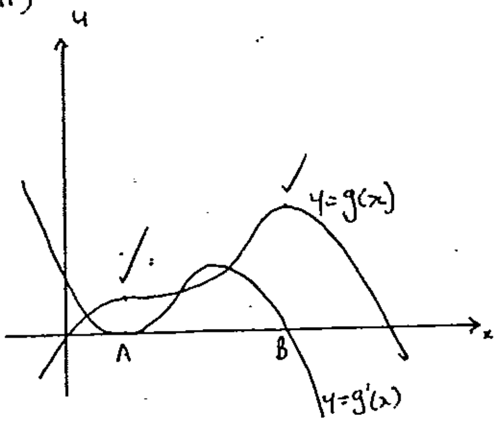
At $x = B$ Maximum turning point occurs ✓

as $g'(B) = 0$ and

$g'(x)$ changes sign ✓

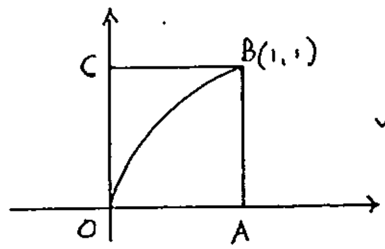
x	$B-$	0	$B+$
$g'(x)$	$+$	0	$-$

(ii)



SOLUTIONS

QUESTION 3



✓

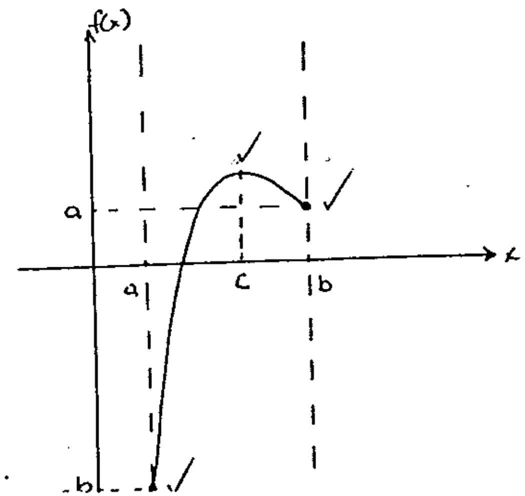
$\int_0^1 x\,dy$ represents the area OBC

Area OBC = area OABC − area OAB ✓

$= 1 \times 1 - \int_0^1 y\,dx$ ✓

$= 1 - \int_0^1 y\,dx$.

QUESTION 4



QUESTION 5

(c) $y^2 = 8Ax$ ✓

QUESTION 6

Area $= 2\int_0^3 \frac{1}{3}x\,dx$ ✓

Area $= \int_0^3 \frac{1}{3}x\,dx + \left|\int_{-3}^0 \frac{1}{3}x\,dx\right|$ ✓

QUESTION 7

No it is not correct ✓

The probability is ¼

there are four possibilities

BB, BG, GB, GG.

QUESTION 8

(i) Using pythagoras

$100^2 = x^2 + y^2$

$y^2 = 10000 - x^2$

$y = \sqrt{10000 - x^2}$ ✓

(ii) Area $= x \cdot y$

$= x \cdot \sqrt{10000 - x^2}$ ✓