PRESENTATION COLLEGE CHAGUANAS

CAPE MATHEMATICS UNIT I – Practice Test Module 1

Form: 6S1/N1/B1 ACADEMIC YEAR: 2013/14 Time: 1 hour

INSTRUCTIONS TO CANDIDATES

- Answer ALL questions
- Show all working clearly. Marks will be given for the correct steps in the solutions.
- The use of silent electronic calculators(non programmable) is allowed.
- Attempt each question on a new page

1. Let p and q be two propositions. Construct truth tables for the statements

a)

(i) $p \wedge q$ [1mk]

(ii) $p \wedge (p \rightarrow q)$ [3mks]

b) What is meant by logical equivalence? [1mk]

c) Prove by Mathematical Induction $\sum_{r=1}^{n} 4r\,(r-1) = \frac{4n\,(n+1)\,(n-1)}{3}$ [7mks]

2. a) The polynomial f(x) is defined by $10x^3 + x^2 - 8x - 3$.

(i) Use the Factor Theorem to show that (x -1) is a factor of f(x) [2mks]

(ii) Find the remaining factors of f(x). [4mks]

(iii) Hence solve, $(10x^3 + x^2 - 8x - 3)(x^2 - 16) = 0$ [4mks]

3. **Figure 1**

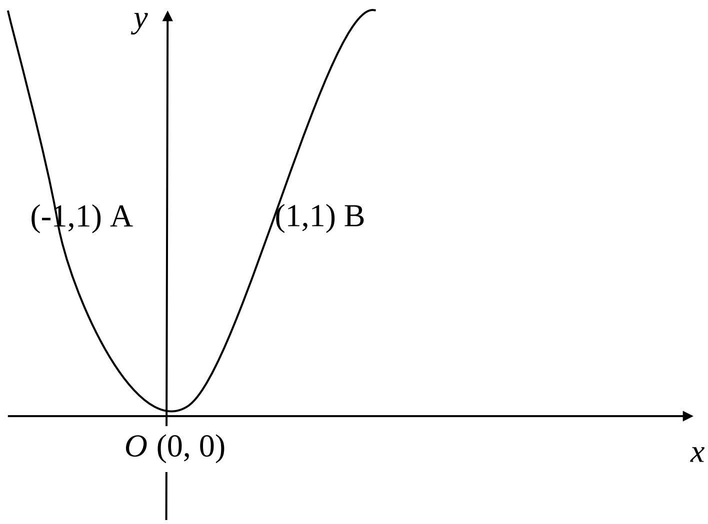

Figure 1 shows a sketch of the curve with equation $y = f(x)$. The curve passes through the points (-1, 1) and (1, 1) and touches the x-axis at the point (0, 0).
On separate diagrams, sketch the curve with equation

(a) $y = f(x + 1)$ (b) $y = 2f(x)$ (c) $y = f\left(\frac{1}{2}x\right)$ [6mks]

On each diagram show clearly the coordinates of any points at which the curve meets the axes.

d) The function***, f and g,*** are defined on **R** by f: $x \to 6x + 10$ and g: $x \to x - 7$

(i) Show that ***f*** is one to one. [2mks]

(ii) Find $f[g(x)]$ and $g[f(x)]$ [4mks]

(iii) Determine the value(s) of x for which $f(g(2x+1)) = f(3x-2) + 4$ [4mks]

4.

(a)(i) Rationalise the denominator of $\frac{(2-\sqrt{x})}{(2+3\sqrt{x})}$ [3mks]

(ii) Hence show that $\frac{(2-\sqrt{x})}{(2+3\sqrt{x})}(4-9x) = 4 - 8\sqrt{x} + 3x$ [2mks]

(b) Solve the following simultaneous equations.

$\log(x-1) + 2\log y = 2\log 3$
$\log x + \log y = \log 6$ [6mks]

(c)The cubic equation $2x^3 - 3x^2 + 4x + 6 = 0$ has roots α, β and γ. Find the new equation whose roots are $\frac{2}{\alpha}, \frac{2}{\beta}$ and $\frac{2}{\gamma}$ [6mks]

(d) Solve the inequality $\frac{4x+1}{3x-2} < 0$ [5mks]