MATH 1115 - Fundamental Mathematics for the General Sciences I

ASSIGNMENT 4 (GROUP 1)¹

- To be submitted by 4 p.m. on Thursday, 10th. November, 2016 in the Department of Mathematics and Statistics (BOX labelled MATH 1115 G1 as appropriate). Late assignments will be deducted 50% of achieved mark. Assignments submitted more than 24 hours late will be awarded a mark of zero.
- On your script, please include in the following order: Course code and Group number, Assignment number, Name, ID number and Instructor's name (Ms. L Addison). For example, Math 1115 G1, Assignment #4, Jane Doe, 81009672, Ms. L. Addison.
- Please ensure that you submit your script in the appropriate box in the department, labelled FOR YOUR GROUP of Math 1115.
- Attempt ALL questions, showing ALL working where applicable.
- Note that a selection of the questions will be marked, not necessarily all.

Note: $lg \equiv log_{10}$ where applicable.

- 1. Do the following.
 - a) Show that lg256 lg64 + lg16 = 3lg4
 - b) Without using calculators, simplify: $log_2 6 \times log_6 8$
- 2. Solve for x in the following. Express your answer to 2 decimal places (where necessary). a) $3^{2x} = 5^{x+1}$
 - b) $log_2 5 + log_2 x = log_2 125$
 - c) $\ln(x+1) \ln(2x) = ln4$ (Recall: $\ln \equiv log_e$)
 - d) $lg(x+2)^3 = 9$
- 3. Expand each of the expressions, as far as possible, in terms of lg(x), lg(y) and lg(z).
 a) lg(x³yz²)

b)
$$lg\left(\frac{x^3}{x^2z}\right)$$

c)
$$lg\left(x\sqrt{\frac{y^2}{z^3}}\right)$$

- 4. Solve the following.
 - a) $-x^2 + 2x = 1$, by factorization by grouping.
 - b) $5x^2 4x 2 = 0$, by completing the square.
 - c) $5x^2 + x 1 = 0$, by quadratic formula.

(Please turn over)

5. Using the following facts, solve the equations below:

$$pH = -\log[H^+]; \quad pOH = -\log[OH^-]; \quad pH + pOH = 14$$

- Find the pH of a solution whose hydrogen ion concentration is given by i) $[H^+] = 2.4 \times 10^{-5} M$ Is the solution acidic or alkaline?
- What is the $[H^+]$ of a solution that has a *pOH* of 8.4? ii)

Note: *M* represents molars, a unit used to measure hydrogen ion concentration.

6. a) Using the long division method, simplify the following improper algebraic fraction: [Hint: Answer is of the form $x^2 + Bx + c - \frac{D}{5x-2}$].

b) Using the Factor Theorem, show that (x - 3) is a factor of $f(x) = x^3 - 3x^2 - 16x + 48$.

- 7. Using the Polynomial Long Division AND Remainder Theorem, find the remainder when $f(x) = 4x^3 - x^2 + x - 2$ is divided by a) *x* − 1
 - b) 2x + 1

THE END