Examination	Final Exam
Course Code	MAT 142
Course Name	Algebra Essentials
Lecturers	Allison Drysdale-Felix Antonia Laurent Goodman Petrus Jn. Francois
Duration	2 hours

Student ID _____

Instructions

Question	Student's mark	Max Score
1		4
2		9
3		11
4		14
5		9
TOTAL		**47**

1.

a. Describe the transformation of $f(x)$ to $g(x) = 4f(x-3)+1$ [3]

b. A point $A(-1, 5)$ on $f(x)$ is transformed by reflecting $f(x)$ in the y axis. State the value of the new point. [1]

2. Given that $f(x) = 3x^2 - 19x - 14$, $g(x) = 2x - 1$, $h(x) = \frac{2x+3}{x-1}$ $x \neq 1$

(a) Find the value of x for which $g(x-4) = 11$ [3]

(b) Find a simplified expression for the composite function $gf(x)$ [2]

(c) Determine $h^{-1}(x)$ [4]

3.

(a) Given that $(x-5)$ is a factor of $p(x) = 3x^3 - 5x^2 - 58x + 40$, factorize fully $p(x)$ [4]

(b) A polynomial is defined by $f(x) = px^3 + 6x^2 + 12x + q$, where p and q are constants.

Given that the remainder when $f(x)$ is divided by $(x-1)$ is **equal** to the remainder when $f(x)$ is divided by $(2x+1)$.

(i) Find the value of p. [5]

Given also that $q = 3$, and p has the value found in part (a),

(ii) Find the value of the remainder when $f(x)$ is divided by $(2x+1)$ [2]

4.

a. Simplify $(16x^{12})^{\frac{3}{4}}$ [2]

b. Given that $2^a = 32\sqrt{2}$ find the value of a. [3]

Solve the following equations giving your answer to three decimal places.

c. $\log_4(2x + 4) - 3 = \log_4 3$ [4]

d. Solve $4^x - 5(2^x) + 2^2 = 0$. [5]

5. Given that $2\log_2(x+15) - \log_2 x = 6$

   a. show that $x^2 - 34x + 225 = 0$ [5]

   b. Hence or otherwise, solve the equation
   $2\log_2(x+15) - \log_2 x = 6$ [4]

END OF EXAMINATION