

Science and Engineering Foundation Programme

Mid-Semester Module Assessment

SEF001 Mathematics 1

Wednesday 9 November 2016, 1pm

FULL NAME:

STUDENT ID:

TUTOR GROUP:

Instructions:

DO NOT TURN OVER THE SCRIPT until the test has started.

Make sure you read all questions carefully.

CALCULATORS:

Only Casio fx-82, fx-83 and fx-85 are allowed (+ extensions like ES, GT, GT plus) .

For marking purposes only:

Question	Marks
1	
2	
3	
4	
5	
TOTAL :	

1. (a) Simplify:

$$\frac{a^4 \times a^{-2}}{(a^{-1})^3} \times \sqrt{\frac{1}{a^3}}$$

(b) Solve the following equation for x : $2 \times 3^x = 1 - 3^{2x}$

Give any solutions in their exact form as well as rounded to 3 decimal places.

2. Using long division write $\frac{x^3 + 4x^2 - 7x + 6}{x + 4}$ in the form $q(x) + \frac{r(x)}{q(x)}$

3. (a) Find the perpendicular bisector of $P = (-2, 1)$ and $Q = (4, 3)$.
- (b) A circle has its centre at P and passes through Q . Write down the equation of the circle in
- Cartesian coordinates (x, y)
 - Parametric form using the angle θ
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4. Let $f(x) = x^2 - 4x + 7$.

- (a) Write $f(x)$ in the form $(x + a)^2 + c$ and sketch its graph.
 - (b) Choose the largest possible domain and range such that $f(x)$ is invertible.
 - (c) Find the inverse function $f^{-1}(x)$ of $f(x)$, using the above domain and range.
 - (d) Determine whether $g(x) = \frac{4x}{x^2 + 2}$ is odd, even or neither.
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