

School of Mathematics & Applied Statistics
MATH141: Mathematics 1C, Part 1
Assignment Week 1
Autumn 2006

Student Name: _____ *Student Number:* _____

FULL WORKING is to be shown for all solutions.

Untidy or badly set out work will not be marked, and will be recorded as unsatisfactory.

This assignment is to be handed in during your tutorial in Week 2.

- Question 1.** (a) Simplify $x\sqrt[6]{x^3y^9} + y^{-1}\sqrt{x^3y^5}$ as far as possible.
- (b) Solve the equation $\frac{2}{x-2} - \frac{3}{x} = 1$.
- (c) Find the values of x such that (i) $2x^2 - 13x + 21 < 0$, (ii) $\left|\frac{x}{3}\right| < 1$.
- (d) Given that $\sin \theta = -\frac{4}{5}$ and $\pi \leq \theta \leq \frac{3\pi}{2}$, find the **exact value** of
 (i) $-\cos \theta$, (ii) $\cot \theta$.
- (e) Find a and b such that $\frac{3}{\sqrt{5}-2} = a + \sqrt{b}$.
- (f) Express $\log_a x + 2\log_a(x+1) - \log_a(x-1)$ as a single logarithm.

- Question 2.** (a) If possible, solve the system of equations $4x - 2y = 0$;
 $x + y = 9$.
- (b) Evaluate and simplify the following summations.
 (i) $\sum_{m=0}^0 -3$ (ii) $\sum_{i=1}^3 2^{-i+j}$ (iii) $\sum_{k=2}^{22} \left(\frac{1}{k^2} - \frac{1}{(k-1)^2}\right)$
- (c) Briefly discuss the value of $\sum_{i=1}^n \delta_{ki} a_{ij}$, $k \in \mathbb{Z}$ (the set of integers).

- Question 3.** (a) Sketch the graphs represented by the following equations.
 (i) $y = \sqrt{2x+3}$ (ii) $y = 2 \cos 3x$ (iii) $x^2 + y^2 = 4$
 (iv) $y = x^2$ (v) $y = x^2 - 3$ (vi) $y = (x-3)^2$
- (b) Let $g(x) = \begin{cases} x & x \leq -2, \\ 1 & -2 < x < 0, \\ -x & x \geq 0. \end{cases}$
- (i) Sketch the graph of $g(x)$. (ii) Find $g(2) + 3g(-\frac{1}{2}) - g(-2)$.

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Submission Receipt

Student Name: _____ *Student Number:* _____

Tutorial Class: _____ *Date Submitted:* _____ *Tutor Initials:* _____

Question 4.

- (a) Write down your degree course.
- (b) Give an example of a problem relevant to your degree course that can be solved mathematically.

You do not need to provide a mathematical model/equation for your problem.

Instead you must explain what the problem is, in terms that are understandable to your tutor, and how mathematics would be used to solve the problem.

If your example comes from a web page or a book should you provide an appropriate reference.