MATH1050 Semester 1, 2008 **Assignment 4**

due Friday, 16 May, 4pm

Complete the following problems and submit your solutions into the assignment box for your tutorial group. The assignment boxes are located on level three of the Priestley (Mathematics) Building (67), next to the lifts. The boxes are cleary labelled as **MATH1050**, and there is one for each of the tutorial groups T1-T19. Please take care to ensure your assignment is placed in the correct box. Late assignments will be accepted only with a medical certificate or evidence of other exceptional circumstances.

Ensure that your assignment is stapled, and that your name, student number, tutor's name and tutorial group are clearly marked on the front page of your assignment before you hand it in. You do NOT need a cover sheet.

Each of the five assignments will contribute 3% towards your final grade. Although you are encouraged to discuss the assignment questions with your peers, your written assignment must be your own work. Solutions to the assignment will be distributed approximately one week after the due date.

1. Consider the following functions:
$f(x) = x + 1$, $g(x) = x - 1$, $h(x) = 2x$, $m(x) = 4x$, $n(x) = x^2$, $p(x) = \sqrt{x}$, and $q(x) = 2x + 1$.
Use composition of functions and one or more of f, g, h, m, n, p and q to define two new functions: $y(x) = x^2 - 2x + 1$ and $z(x) = 4x^2$

2. Let $f(v) = \sin v$, and $g(v) = \frac{1}{2v-1}$.

(a) Find $g \circ f$ and state the domain and range.

(b) Is $g(v)$ one-to-one? Find $g^{-1}(v)$, the inverse function of $g(v)$, and state the domain and range.

3. Determine the limit:

$$\lim_{x \to -3} \frac{\sqrt{x^2 + 7} - 4}{x^2 - 9}.$$

4. In each of Parts (a), (b) and (c) find y', **simplifying where possible**.

(a) $y = 2x^3 - 5x + 2e^x - 7\ln x$

(b) $y = \dfrac{x^2 + 3}{2x^2}$

(c) $y = 3(2x^2 + 5)^{-1}$

5. Let $y = -2x^3 + 3x^2 - 3$. Find and classify all critical points of y. Sketch the function, showing all important points.