

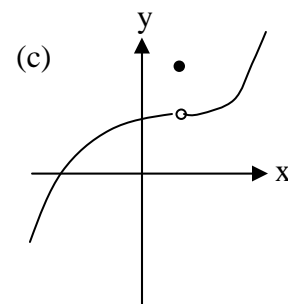
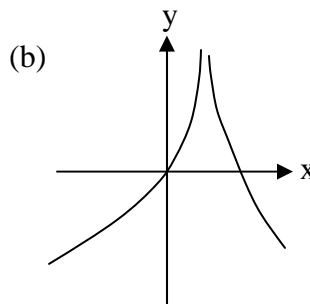
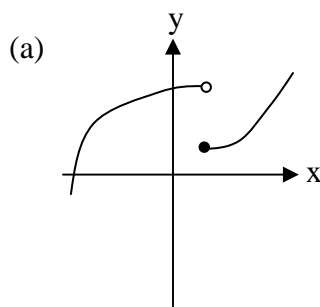
## Assignment 2

## MATH 1500

(Follows Unit 7 in the manual)

### Values

- [6] 1. Each of the following graphs contains a discontinuity. Determine whether the discontinuity is (i) a removable discontinuity (ii) a jump discontinuity or (iii) an infinite discontinuity



- [6] 2. Each of the following functions contains a discontinuity at  $x = 2$ . Determine whether the discontinuity at  $x = 2$  is (i) a removable discontinuity (ii) a jump discontinuity or (iii) an infinite discontinuity

(a)  $f(x) = \llbracket x - 2 \rrbracket$       (b)  $f(x) = \frac{x^2 + 4}{x - 2}$       (c)  $f(x) = \frac{x^2 - 4}{x - 2}$

- [5] 3. Show that the function  $f(x) = x^3 - 5x + 3$  has two zeros in the interval  $[0, 2]$ .

- [4] 4. Consider the function  $f(x) = \begin{cases} 5x + c & \text{if } x \leq 2 \\ x^2 + 4 & \text{if } x > 2 \end{cases}$ . For what value of  $c$  will this function be continuous at  $x = 2$ ?

- [8] 5. Evaluate the following limits.

(a)  $\lim_{x \rightarrow -\infty} \frac{\sqrt{3x^2 + x}}{2x + 3}$

(b)  $\lim_{x \rightarrow \infty} (\sqrt{x^2 + 2x} - x)$

- [9] 6. Find the horizontal and vertical asymptotes of  $f(x) = \frac{\sqrt{4x^2 + x}}{2x+1}$ .
- [6] 7. A particle moves along a straight line with equation of motion  $s = f(t)$ , where  $s$  is measured in meters and  $t$  in seconds. Find the velocity when  $t = 2$ .  
 $f(t) = 2t^3 - t + 1$
- [6] 8. Use the definition of the derivative to find the derivative of  $f(x) = x + \sqrt{x}$ .
- [15] 9. Find the derivatives of the following functions. Do not use the definition of the derivative. You need not simplify your answers.
- (a)  $f(x) = 3x^{2/5} - 3\sqrt{x} + e^x + \pi^2$
- (b)  $f(x) = (4x^2 - e^x)(3\sqrt{x} + \sin x)$
- (c)  $f(x) = \frac{3x^{2/3} + 2 \tan x}{x^4 - 2x}$
- [5] 10. Evaluate  $\lim_{x \rightarrow \pi/4} \frac{\sin x - \cos x}{\cos 2x}$ .

**Solution:**

**Total = 70**