

THE CHINESE UNIVERSITY OF HONG KONG
DEPARTMENT OF MATHEMATICS

MATH1520C University Mathematics for Applications 2014-2015
Assignment 2

- Due date: 12 Feb, 2015 (before 17:00)
- Remember to write down your name and student number
- Please work on ALL questions below

Questions from the textbook:

Exercise 2.4: 81

Exercise 4.3: 25, 29, 37, 61, 63, 85

1. Let $f(x) = \begin{cases} 2x - 1 & \text{if } x > 1, \\ x^2 & \text{if } 0 \leq x \leq 1. \end{cases}$

- (a) Is $f(x)$ continuous at $x = 1$?
- (b) Is $f(x)$ differentiable at $x = 1$?

2. Let $f(x) = \frac{x^3}{x^2 - 1}$, where x is a real number and $x \neq \pm 1$.

- (a) Find $f'(x)$ and $f''(x)$ for $x \neq \pm 1$.
- (b) Find the range of x such that
 - (i) $f'(x) > 0$
 - (ii) $f'(x) < 0$
 - (iii) $f''(x) > 0$
 - (iv) $f''(x) < 0$
- (c) Find the local maximum and minimum points and the points of inflection, if any.
- (d) Find horizontal and vertical asymptotes of the graph of $f(x)$, if any.
- (e) Sketch the graph of $f(x)$.