

Name: Solution

Student Number:

## Problem 1

Give the mathematical definition of a critical number  $c$  of a function  $f$ .

A number  $c$  in the domain of  $f$  is called a critical number of  $f$  if:

$$(i) \ f'(c) = 0 \quad \underline{\text{or}} \quad (ii) \ f'(c) = \text{DNE}$$

## Problem 2

Find the critical numbers of the function  $f(x) = 2x^3 - 3x^2 - 36x$ .

$$f(x) = 2x^3 - 3x^2 - 36x$$

$$f'(x) = 6x^2 - 6x - 36 = 6(x-3)(x+2)$$

$$\text{Set } f'(x) = 0$$

$$\text{So, } 6 \cdot (x-3)(x+2) = 0$$

$$x = 3 \quad \text{or} \quad x = -2$$

Note: Since domain of  $f'$  is  $\mathbb{R}$ , there are no points where  $f'$  does not exist!

Critical numbers:  $x = -2$  &  $x = 3$ .