

## CSD1251/CSD1250 Week 9 Tutorial Problems

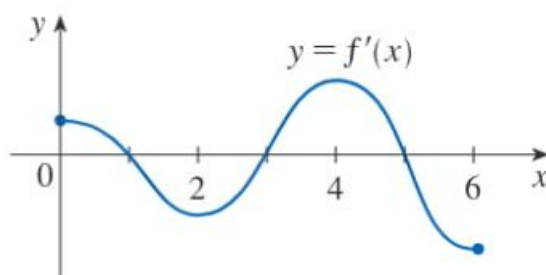
27th February – 5th March 2023

It is recommended to treat the attempt of these problems seriously, even though they are not graded. You may refer to the lecture slides if you are unsure of any concepts.

After attempting each problem, think about what you have learnt from the attempt as a means of consolidating what you have learnt.

### Question 1

The graph of the **derivative**  $f'$  of a function  $f$  is shown below (note that this graph can also be found in Example 1 from Slide 13 of Week 5 Slides).



Find the values of  $x$  where

- (a)  $f$  attains a local maximum value (i.e.  $x$  is a local maximum point).
- (b)  $f$  attains a local minimum value (i.e.  $x$  is a local minimum point).

## Question 2

For each of the following functions, find (i) their critical points (if there are any), and (ii) determine which of these critical points give rise to local maximum values, or local minimum values, or neither.

$$(a) f(x) = 3x^2 + x - 2 \quad (b) g(v) = v^3 - 12v + 4 \quad (c) f(x) = 3x^4 + 8x^3$$

$$(d) f(x) = 3x^4 + 8x^3 - 48x^2 \quad (e) g(t) = t^5 + 5t^3 + 50t \quad (f) f(x) = |x|$$

$$(g) h(y) = \frac{y-1}{y^2-y+1} \quad (h) p(x) = \frac{x^2+2}{2x-1} \quad (i) f(x) = x + \frac{4}{x^2}$$

$$(j) g(x) = x^{\frac{4}{5}}(x-4)^2 \quad (k) f(x) = x^4 e^{-x} \quad (l) g(x) = x^2 \ln x$$