

Assignment 2

MATH1111: Introduction to Calculus

Semester 1, 2011

1. Consider $f(x) = -4x^2 + x - 1$.
 - (a) Find $f'(x)$.
 - (b) Find the point on the graph $y = f(x)$ where $f'(x) = 0$.
 - (c) Find $f''(x)$.
 - (d) Using your result from part c) explain why the graph of $y = f(x)$ is concave down.

2. Find the equation of the line tangent to the graph of f at $(\pi, 0)$, where f is given by

$$f(x) = x^3 \sin(2x).$$

3. Consider $f(x) = e^{2x}(x + 2)$.
 - (a) Find the derivative of $f(x)$.
 - (b) For which values of x is $f'(x)$ strictly positive?
 - (c) For which values of x is $f'(x)$ strictly negative?
 - (d) Using your results from parts b) and c) give the interval on which $f(x)$ is increasing.
4. Find all the local maximum, local minimum and inflection points of $f(x) = e^{-x^2/2}$ and hence sketch $y = f(x)$ showing all the points you've found.

5. The number, N , of people who have heard a rumor spread by mass media at time, t , in days, is modelled by

$$N(t) = \frac{a}{1 + be^{-kt}}.$$

- (a) If 50 people have heard the rumour initially and 300,000 people hear the rumour eventually, find a and b .
- (b) If the rumour is initially spreading at the rate of 500 people per day, find k .