

### MCS 107 MT2 Questions

- 1) Given the function  $f(x) = 4 + x - 2x^2 - 4x^3$
- Find the intervals of increasing and decreasing
  - Find local maximum and minimum points
  - Find the intervals of concavity and inflection points
- 2) Find  $f'(x)$ , if
- $f(x) = \log_4(x + 2)^5$
  - $f(x) = (16x + 76)e^{4x+9}$
  - $f(x) = \sqrt{3x + 1} + 2^{3x+1}$
- 3) The total revenue from the sales of a certain product are given by  $R(x) = \frac{20x}{\ln(3x + 4)}$ .  
Find the marginal revenue.
- 4) Let  $f(x) = \begin{cases} x^3 - 8 : x \leq -1 \\ 4x - 2 : -1 < x \leq 1 \\ 2 : x > 1 \end{cases}$
- Find  $f(-1)$  and  $f(\frac{1}{2})$
  - Is  $f$  continuous at  $x = -1$  and  $x = 1$ ?
  - Find  $f'(1)$  (if exists)
- 5) Given  $f(x) = (x^2 + 3)e^{-x}$ .
- Find  $f'(0)$
  - Find equation of tangent line at  $(0, 3)$
- 6) Evaluate
- $\lim_{x \rightarrow 1} \frac{1 + x - 2x^2}{3x^2 + 2x - 5}$
  - $\lim_{x \rightarrow \infty} \frac{1 + x - 2x^2}{3x^2 + 2x - 5}$
  - $\lim_{x \rightarrow 2} \frac{\sqrt{3x + 10} - 4}{x - 2}$