Ph1105 Problem Sheet B

1. Evaluate the following limits

(i) $\lim_{x\to 2} \dfrac{2-x}{4-x^2}$

(ii) $\lim_{x\to -3} \dfrac{x^2-x-12}{x^2+2x-3}$

(iii) $\lim_{x\to \infty} \dfrac{\sqrt{36x^2-100}}{5-x}$.

2. Differentiate the following functions with respect to x

(i) $y = \dfrac{\sqrt{x}-1}{\sqrt{x}+1}$

(ii) $y = \left(\dfrac{x^2}{8} + x - \dfrac{1}{x}\right)^4$

(iii) $y = (4x+3)^4(x+1)^{-3}$.

3. Find $\dfrac{dy}{dx}$ for each of the following functions

(i) $x^2y + 3xy^3 - x = 3$

(ii) $x^3y^2 - 5x^2y + x = 1$

(iii) $\dfrac{1}{x} + \dfrac{1}{y} = 4$.

4. Find $\dfrac{d^2y}{dx^2}$ if

(i) $y = \left(1 + \dfrac{1}{x}\right)^3$

(ii) $y = \sin x + \cos x$.