

## Assignment No. 2

Q.No.1. Evaluate the following limits by using the L'Hopital rule.

(i)

$$\lim_{x \rightarrow \infty} \frac{3x^2 + x + 4}{5x^2 + 8x}.$$

(ii)

$$\lim_{x \rightarrow 0} \frac{e^x - 1 - x - x^2/2}{x^3}.$$

Q.No.2 Find the derivatives of the following functions

(i)  $f(x) = (x^2 + 2x - 5)(x^3 - 1)$

(ii)  $f(x) = \frac{x^2 + 1}{x - 3}$

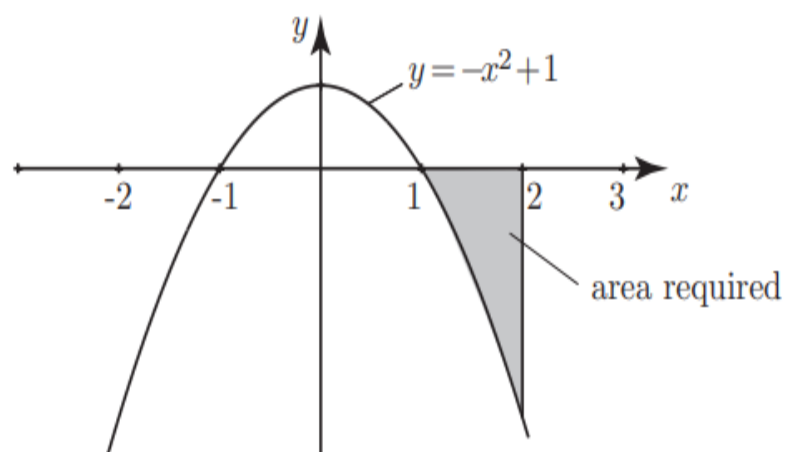
(iii)  $f(x) = \sin x \cos x$

(iv)  $f(x) = \frac{e^{-3x}}{x^2 + 1}$

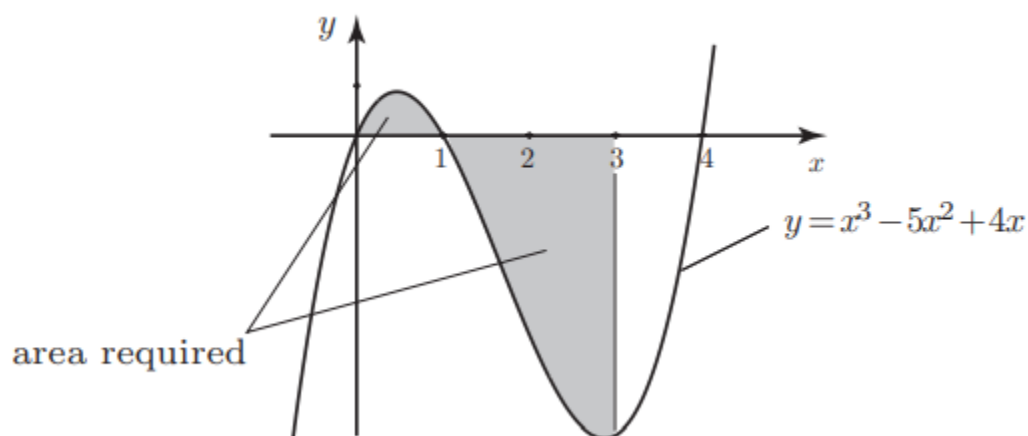
(v)  $f(x) = \frac{\ln(x^2 - 1)}{\ln(x^3 - 1)}$

Q.No.3 Evaluate the area bounded by the curve and x-axis

(i)



(ii)



Q.Nos.4. Evaluate the following integrals

(i)

$$\int (3x + 5)^6 dx$$

(ii)  $\int_0^4 v(x) dx$  where  $v(x) = \begin{cases} 2x & x < 3 \\ -2x & x > 3 \end{cases}$

(iii)

$$\int_{-6}^1 g(z) dz \text{ where } g(z) = \begin{cases} 2-z & z > -2 \\ 4e^z & z \leq -2 \end{cases}$$

Q.No.5. Check whether the following vectors are orthogonal or not.

(i)  $\mathbf{a} = \mathbf{i} + 2\mathbf{j}$  and  $\mathbf{b} = 2\mathbf{i} - \mathbf{j}$ , also evaluates  $-2\mathbf{a}+3\mathbf{b}$

(ii)  $\mathbf{a} = 3\mathbf{i}+2\mathbf{j}$  and  $\mathbf{b}=7\mathbf{i}-5\mathbf{j}$

(iii)  $\mathbf{a}= \mathbf{i}+2\mathbf{j}+3\mathbf{k}$  and  $\mathbf{b}= 4\mathbf{i}+5\mathbf{j}+6\mathbf{k}$ , , also evaluates  $-\mathbf{a}-3\mathbf{b}$