Q1

Find the absolute maximum and minimum value of the following ftns: [using First and 2nd Derivative test].

(i) $f(x) = 12 + 4x - x^2$, $[0, 5]$

(ii) $f(x) = x + \frac{1}{x}$, $[0.2, 4]$

(iii) $f(x) = \ln(x^2 + x + 1)$ $[-1, 1]$

(iv) $f(x) = x - 2\tan^{-1}x$ $[0, 4]$.

Q2

Verify that the function satisfies the three hypotheses of Rolle's theorem on the given Interval then find the all numbers c that satisfy the conclusion of Rolle's theorem

(i) $f(x) = 2x^2 - 4x + 5$, $[-1, 3]$

(ii) $f(x) = \sin(x/2)$ $[\pi/2, 3\pi/2]$.

Q3

Verify the hypotheses of mean value theorem (MVT) and then find the number c, that satisfies the conclusion of MVT.

(i) $f(x) = 2x^2 - 3x + 1$ $[0, 2]$

(ii) $f(x) = \ln x$ $[1, 4]$

Q4 Use the Mean Value Theorem to prove the inequality

$$|\sin a - \sin b| \leq |a-b|$$

for all a, and b.

Q5. (a) Find the interval of increas or decrease

(b) " " local max. and minimum values

(c) Find the interval of concavity and inflection point.

(i) $f(x) = x^3 - 12x + 2$.

(ii) $h(x) = (x+1)^5 - 5x - 2$.

(iii) $S(x) = x - \sin x \quad 0 < x \leq 4\pi$

(iv) $f(\theta) = 2\cos\theta + \cos^2\theta \quad 0 \leq \theta \leq 2\pi$

Q6. Solve example (4, 5, 6) in details

See Book (page no. 335).

Q7 Find the linerization at $x = -1$

$$f(x) = \sqrt[3]{\left(1 - \frac{x}{2+x}\right)^2}$$

Q8. Find dy of the following

$$y = \frac{2\sqrt{x}}{3(1+\sqrt{x})}.$$

Q9. The total surface area 's' of a circular cylinder is ~~attached~~ related to the base radius 'r', heigh 'h' by the equation

$$S = 2\pi r^2 + 2\pi r h.$$

(a) How is $\frac{dS}{dt}$ related to $\frac{dr}{dt}$ if h is constant

(b) If r is constant.