Page 1

Maths 2

ID = 13639

Q1 (A)

Sol

Let

x and y = the numbers

Z = sum of their cubes

$$K = x + y$$

$$y = K - Z$$

$$Z = x^3 + y^3$$

$$Z = x^3 + (K - Z)^3$$

$$\frac{dz}{dx} = 3x^2 + 3(K - Z)^2(-1) = 0$$

$$x^2 - (K^2 - 2Kx + x^2) = 0$$

$$x = \frac{1}{2}K$$

$$y = K - \frac{1}{2}K$$

$$y = \frac{1}{2}K$$

$$x = \left(\frac{1}{2}K\right)^3 + \left(\frac{1}{2}K^3\right)$$

$$\boxed{x = \frac{1}{4}K^3}$$

Ans

Maths 2

Q1 (B)

sol

Let x and y = the numbers

$x + y = 2 \longrightarrow$ Eq (1)

$1 + y' = 0$

$y' = -1$

$Z = x^3 + y^2 \longrightarrow$ eq $\longrightarrow$ (2)

$dz/dx = 3x^2 + 2y\,y' = 0$

$3x^2 + 2y(-1) = 0$

$y = 3/2\, x^2$

From eq $\rightarrow$ (1)

$x + 3/2\, x^2 = 2$

$2x + 3x^2 = 4$

Q4 P

page 4

Maths 2

13639

Q1 B

$$3x^2+2x-4=0$$

$$\boxed{x=0.8685 \ \& \ -1.5352}$$

Use

$$x=0.8685$$

$$y=\frac{3}{2}(0.8685^2)$$

$$\boxed{y=1.1315}$$

$$z=0.8685^3+1.1315^2$$

$$\boxed{z=1.9354}$$

Ans

page 5 Q2 (A)

Maths 2

Sol: The linear approximation is given by the equation.

$$f(x) \cong L(x) = f(a) + f'(a)(x-a).$$

We just need to plug in the known values and calculate the value of $f(3.5)$: ?

$$L(x) = f(3) + f'(3)(x-3) = 12 - 2(x-3)$$
$$= 18 - 2x$$

Then

$$\boxed{f(3.5) \cong 18 - 2 \times 3.5 = 11}$$

Ans

page 6

Maths 2

Q2 B

Sol

let $f(x)\ \sqrt[3]{x}$ The linear approximatio at the Point $a=8$ is given by

$$f(x) \approx L(x) = f(8) + f'(8)(x-8)$$

Find the derivative

$$f'(x) = (\sqrt[3]{x})' = \frac{1}{3}x^{-2/3} = \frac{1}{3\sqrt[3]{x^2}}.$$

Compute the value of the derivative at $a=8$:

$$f'(8) = \frac{1}{3\sqrt[3]{8^2}} = \frac{1}{12}$$

Substituting this, we get the function $L(x)$ in the form.

$$f(x) \approx L(x)\ 2 + \frac{1}{12}(x-8) = \frac{x}{12} + \frac{4}{3}.$$

Hence

$$\sqrt[3]{9} \approx L(9) = \frac{9}{12} + \frac{4}{3} = \frac{9+16}{12}$$

$$\boxed{= \frac{25}{12}}$$

Ans

Q3

$$2xy - 9x^2 + (2y + x^2 + 1)\,dy/dx = 0$$

Sol

$$(2y + x^2 + 1)\,\frac{dy}{dx} + (2xy - 9x^2) = 0$$

We can rewrite this as

$$(2y + x^2 + 1)\,dy + (2xy - 9x^2)\,dx = 0$$

Check for exactness:

Let $M = 2xy - 9x^2$

Let $N = 2y + x^2 + 1$

$$\partial M/\partial y = \partial N/\partial x$$

Page 9 Q3

$\partial(2xy - 9x^2)/\partial y = \partial(2y + x^2 + 1)/\partial x$

$2x = 2x$

Thus it is indeed Exact. To further solve,

$\partial F/\partial x = M = 2xy - 9x^2$

$\int \partial F = \int (2xy - 9x^2)\,\partial x$

$F = (x^2)y - 3x^3 + g(y)$

To get "g"(y), we differentiate it partially with respect to y:

$\partial F/\partial y = \partial/\partial y((x^2)y - 3x^3 + g(y)) = N$

$\partial F/\partial y = x^2 + g'(y) = N$

Page 10

Q3

$$x^2 + g'(y) = 2y + x^2 + 1$$

$$g'(y) = 2y + 1$$

Integrating.

$$g(y) = y^2 + y + c$$

Therefore,

$$\boxed{F = (x^2)y - 3x^3 + y^2 + y + c}$$

Ans