

NAME: HASSAN KAMAL

ID#: 12925

SUBJECT NAME: MULTIVARIATED
CALCULUS

QUESTION#1:

Evaluate

$$\int_0^5 \int_0^x x(x+3x)dydx$$

SOLUTION:

$$I = \int_0^5 \int_0^x x(x+3x)dydx$$

$$= \int_0^5 [x+3x]y$$

$$= x/3y=0dx$$

$$= 13 \int_0^5 xedx$$

$$= 13 \int_0^5 9edu2$$

$$= 16(e-1)$$

Question#2:

Evaluate

$$\int_1^4 \int_0^3 (xy + x^3y^3) dy dx$$

Solution:

$$\int_1^4 \int_0^3 xy^2 dx dy.$$

$$\int_1^4 \int_0^3 xy^2 dx dy$$

$$= \int_1^4 [x^2 y^2]_0^3 dy$$

$$= \int_1^4 (9y^2 - 0) dy$$

$$= \int_1^4 9y^2 dy$$

$$= [3y^3]_1^4$$

$$= 32$$

Question#3:

Find partial derivatives w.r.t r and s

$$f(r,s) = r \ln(r^3 + s^2)$$

Solution:

finding w.r.t (r)

$$f_r = \left\{ \frac{d}{dx} \ln(r^3 + s^2) + r \cdot \frac{d}{dr} \ln(r^3 + s^2) \right\} \frac{d}{dx}$$

$$f_r = 1 \cdot \ln(r^3 + s^2) + r \cdot \frac{1}{r^3 + s^2} \cdot \frac{d}{dr} r^3 + \frac{d}{dr} s^2$$

$$f_r = \ln(r^3 + s^2) + r \cdot \frac{1}{r^3 + s^2} \cdot 3r^2 + 0$$

$$f_r = \ln(r^3 + s^2) + \frac{3r^3}{r^3 + s^2} \quad \text{equation 1}$$

finding with respect s

$$f_s = \frac{d}{ds} r \cdot \ln(r^3 + s^3) + r \cdot \frac{d}{ds} \ln(r^3 + s^3) \cdot \frac{d}{ds}$$

$$f_s = 0 \cdot \ln(r^3 + s^3) + r \cdot \frac{1}{r^3 + s^3} \cdot \frac{d}{ds} r^3 + \frac{d}{ds} s^3$$

$$f_s = 0 + r \cdot \frac{1}{r^3 + s^3} \cdot 0 + 2s$$

$$f_s = \frac{2rs}{r^3 + s^3} \quad \text{equation 2}$$

Question#4:

Finding partial derivatives w.r.t "x"

$$F(x, y, z) = xy^2z^4 + 3yz^2$$

Solution:

Finding w.r.t "x"

$$F_x = \frac{d}{dx} xy^2z^4 + 3yz^2$$

$$f_x = 1 \cdot xy^2z^4 + 3yz^2 + \frac{d}{dx} y^2z^4 + \frac{d}{dx} 3yz^2$$

$$f_x = xy^2z^4 + 3yz^2 \cdot x + 0$$

$$f_x = xy^2z^4 + 3yz^2 + xy^2z^4/3yz^2 \quad \text{equation 1}$$

Question#5:

Find the value of x and y

$$8x - y = -1, \quad 7x - y = -2$$

Solution:

$$8x - y = -1 \quad \text{eqA}$$

$$7x - y = -2 \quad \text{eqB}$$

By taking eqA

$$8x = -1 + y$$

$$X = 1 + y/8$$

Now taking equation B

$$7(1 + y/8) - y = -2$$

$$7(1 + y) - y = -2.8$$

$$7(1 + y) - y = 16$$

$$7 + 7y - y = 16$$

$$7 + 6y = 16$$

$$6y = 16 - 7$$

$$6y = 9$$

$$y = 9/6$$

$$y = 1/2$$

put value of y in eqA

$$8x - 0.5 = -1$$

$$8x = -1 + 0.5$$

$$8x = -0.5$$

$$X=0.5/8$$

$$X=0.0625$$