Day: M T W T F S

Q.No 4) b)

$F(x,y) = 3x^3 + 3x^2y$

$R: 1 \le x \le 3,\ 0 \le y \le 2$

$$\int_1^3 \int_0^2 3x^3 + 3x^2y \; dy\, dx$$

w.r.t dy

$$\left[3x^3y + 3x^2 \frac{y^2}{2}\right]_0^2$$

$$\left[3x^3(2) + 3x^2 \frac{\cancel{4}^2}{\cancel{2}_1}\right] - \left[3x^3(0) + 3x^2 \frac{(0)}{2}\right]$$

$6x^3 + 6x^2$

$\cancel{\int_1^3 6(x^3 + x^2)\, dx}$

$$\int_1^3 6x^3 + 6x^2 \, dx$$

$$\frac{{}^3\cancel{6}x^4}{{}_2\cancel{4}} + \frac{{}^2\cancel{6}x^3}{{}_1\cancel{3}}$$

$$\left[\frac{3}{2}(3)^4 + 2(3)^3\right] - \left[\frac{3}{2}(1)^4 + 2(1)^3\right]$$

$\frac{3}{2}81 + 54 - \frac{3}{2} + 2$

$\frac{243}{2} + 108$

$\frac{3+4}{2} \quad \frac{7}{2}$

Ans

$\frac{351}{2} - \frac{7}{2}$

$\frac{344}{2} = \boxed{172}$

b) table of $f(20, P)$

L \ P				
20	2.65	2.59	2.51	2.43

c) table of $f(L, 3.5)$

L	P 3.5
20	2.59
40	4.05
60	5.00
80	5.29
100	5.77

Date:

Day: M T W T F S

(5) b) $F_p(40, 4.50)$

$$\frac{(40, 4.50+0.50) - (40, 4.50)}{0.50} = \frac{0 - 3.88}{0.50} = -7.76$$

If price of chicken is 40 and 4.50 The weekly consumption of chicken is changed by -7.76.

$u_{zz} = z_1(x^2+y^2+z_1^2)^{-3/2}$

$= -\frac{3}{2} z_1 (x^2+y^2+z_1^2)^{-5/2} (0+0+2z_1)$

$= \frac{-3z_1^2}{(x^2+y^2+z_1^2)^{-5/2}}$

u_{zz}

$u_{xx} + u_{yy} + u_{zz} = 0$

$$\frac{3x^2}{(x^2+y^2+z_1^2)^{5/2}} + \frac{3y^2}{(x^2+y^2+z_1^2)^{5/2}} + \frac{3z_1^2}{(x^2+y^2+z_1^2)^{5/2}} = 0$$

$$\frac{3x^2+3y^2+3z_1^2}{(x^2+y^2+z_1^2)^{5/2}} = 0$$

$$\frac{3(x^2+y^2+z_1^2)}{(x^2+y^2+z_1^2)^{5/2}} = 0$$

$u_{xx} = x\left[x^2+y^2+z_1^2\right)^{-3/2}$

$u_{xx} = -\frac{3}{\cancel{2}} x\left[x^2+y^2+z_1^2\right]^{-5/2} \cdot [2x]$

$$\boxed{u_{xx} = \frac{-3x^2}{(-5)\, x^2+y^2+z_1^2}}$$

$u_y = -\frac{1}{\cancel{2}}\left(x^2+y^2+z_1^2\right)^{-3/2}\left(0+2y+0\right)$

$u_y = \frac{y}{\left(x^2+y^2+z_1^2\right)^{3/2}}$

$u_{yy} = y\left(x^2+y^2+z_1^2\right)^{-3/2}$

$= -\frac{3}{\cancel{2}}\, y\left(x^2+y^2+z_1^2\right)^{-5/2}\left(0+\cancel{2}y+0\right)$

$u_{yy} = \boxed{\frac{-3y^2}{\left(x^2+y^2+z_1^2\right)^{-5/2}}}$

$u_{z_1} = \left(x^2+y^2+z_1^2\right)^{-1/2}$

$u_{z_1} = -\frac{1}{\cancel{2}}\left(x^2+y^2+z_1^2\right)^{-3/2}\left[0+0+\cancel{2}z_1\right]$

QNo4)

(a) $\int_0^{\ln 2} \int_0^{\ln 3} e^{x+y} \, dx \, dy$

$\left[\frac{e^{x+y}}{1+y} \right]_0^{\ln 3}$

$\frac{e^{\ln 3 + y}}{1+y}$

$\frac{1}{1+y} \left(\cancel{\#} e^{\ln 3 + y} \right)$

$\left[y \, e^{\ln 3 + y} \right] dy \Big|_0^{\ln 2}$

$\frac{y^2 \, e^{\ln 3 + y}}{2}$

$\frac{e^{x+y+2y}}{x+y+1}$

$\frac{\ln 2^2 \, e^{\ln 3 + y}}{2}$

$\rightarrow \left[e^{\ln 3 + y} \right]_0^{\ln 2}$

$\boxed{e^{\ln 3 + \ln 2}}$

Assignment No. 2

Multivariable calculus

Q.No.

a) Evaluate $F_L(80, 4.00)$

$$\frac{f(a+h) - f(a+b)}{h} \quad \text{--- (1)}$$

$h = 20$

putting value in eq (1)

$$\frac{f(80+20, 4.00) - f(80, 4.00)}{20}$$

$$\frac{(100, 4.00) - (80, 4.00)}{20}$$

$$\frac{5.60 - 5.19}{20} = \frac{41}{2000}$$

$F_P(40, 4.50)$

$$\frac{f(a, b+h) - (a+b)}{h} \qquad h = 0.50$$

~~a, 40+20)~~ 4.50

$$\frac{(40, 4.50+0.50) - (40, 4.50)}{0.50}$$

Ans) $h(x,t) = 5 \times \cos(0.5x - t)$

$h_x = \boxed{0 \times \sin(0.5x - t) \; 0.5}$ — (1)

$h_t = 0 \times \sin(0.5x - t) \; 0.2$

$h_t = \boxed{-\sin(0.5x - t)}$ — (2)

putting value,

$h_x(2,5)$

$\sin(0.5(2) - 5) \; 0.5$

$\sin(4) \; 0.5$

0.03

if we take derivative of that fn we get h_x and we put value of ~~depth~~ distance $x = 2$ and at fixed point ~~at~~ 5 seconds. The wave is increasing by 0.03

$h_t(2,5)$

$-\sin(0.5(2) - 5)$

$-\sin(4)$

-0.06

if we take w.r.t h_t we get wave in opposite ~~dir~~ direction by -0.06

3) function

$$u = \frac{1}{\sqrt{x^2+y^2+z^2}}$$

verify $u_{xx} + u_{yy} + u_{zz} = 0$

$$u = \frac{1}{(x^2+y^2+z^2)^{1/2}}$$

$$u = (x^2+y^2+z^2)^{-1/2}$$

$$u_x = -\frac{1}{\cancel{2}}(2x+0+0)^{-3/2}$$

$$\cancel{u_{xx} = \frac{3}{4}(2x)^{-5/2}}$$

$$u_x = -\frac{3}{2}x$$

$$u_x = -\frac{1}{\cancel{2}}(x^2+y^2+z^2)^{-3/2} \cdot (\cancel{2}x)$$

$\cancel{u_x =}$

$\cancel{u_x =}$

x