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- Show that  $\int_{0}^{1} dx \int_{0}^{1} \frac{x-y}{(x+y)^{3}} dy \neq \int_{0}^{1} dx \int_{0}^{1} \frac{x-y}{(x+y)^{3}} dx$
- Prove that it c > 1  $\int_0^\infty \frac{x^c}{c^x} dx = \frac{c+1}{(\log c)c+1}$

Find the volume of the Para boloid generated by revolution about the x-axis of the parabole  $y^2 = 4ax$  from x = 0 to x = h

If  $V = e^{xyz}(i+j+k)$ find curely

14. Prove div (axb) = b. cure a - a. cure b

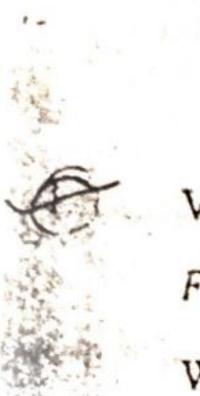
(13) Show that

 $\int_{s} (axi + byj) + (zk). \hat{n}ds = \frac{1}{3}\pi(a+b+c)$ 

Where S is the surface of the sphere  $x^2 + y^2 + z^2$ 

Section B

Note! Attempt any three questions. Luch question ca



Verify stoke's theorem when

$$F = (2x - y)i - yz^2j - y^2zk$$

Where S is the Upper half of sphere  $x^2 + y^2 + z^2 = 1$ and  $\varepsilon$  is boundary

Show that the Larger of two areas into which the circle  $x^2 + y^2 = 6ya^2$  is divided by the parabola  $y^2 =$  $12ax is \frac{16}{7} a^2 (8\pi - \sqrt{3})$ 

Apply Pirichlel's integral to find the moment of inertia about the z axis of an octant of the ellipsoid

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$$

Find the minimum value of

$$x^2 + y^2 + z^2$$
 give that  $ax + by + cz = p$ 

If 
$$y = e^{a\sin^{-1}x}$$

Prove that

$$(1-x^2)y_{n+2}-(2n+1)xy_{n+1}-(n^2+a^2)y_n=0$$

Find the characteristic equation of the matrix

$$\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & 1 & 2 \end{bmatrix}$$

Verify that it said had by A and hence obtain A