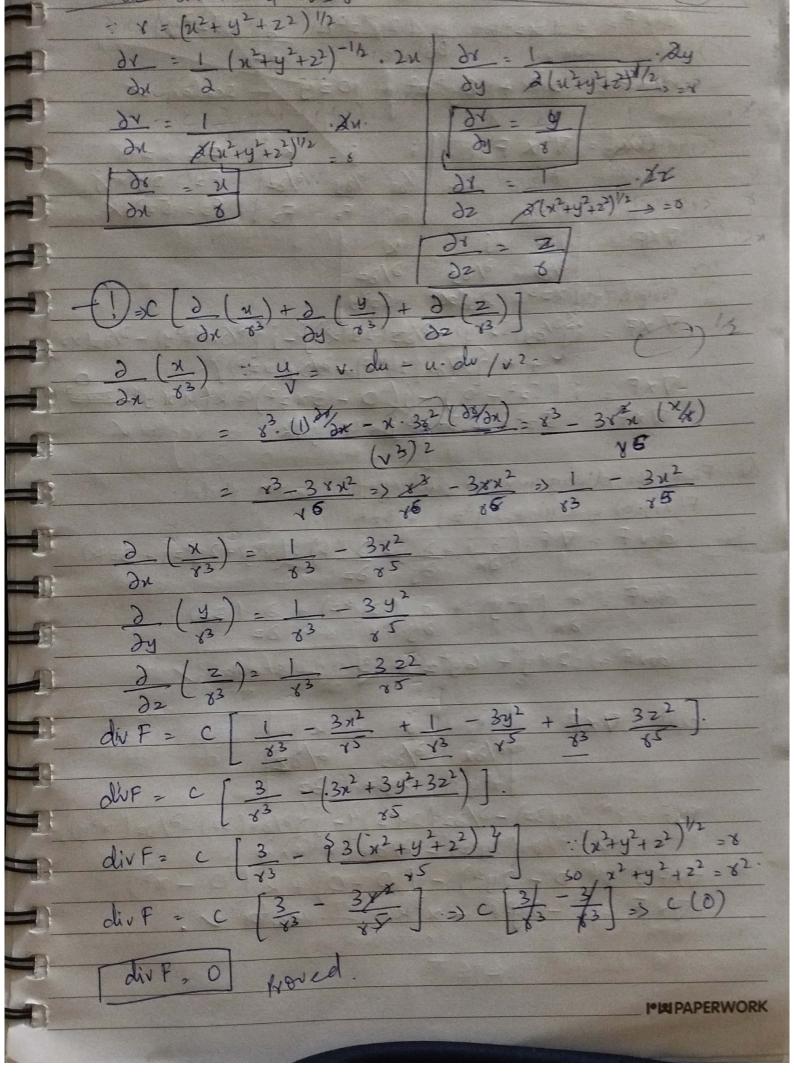
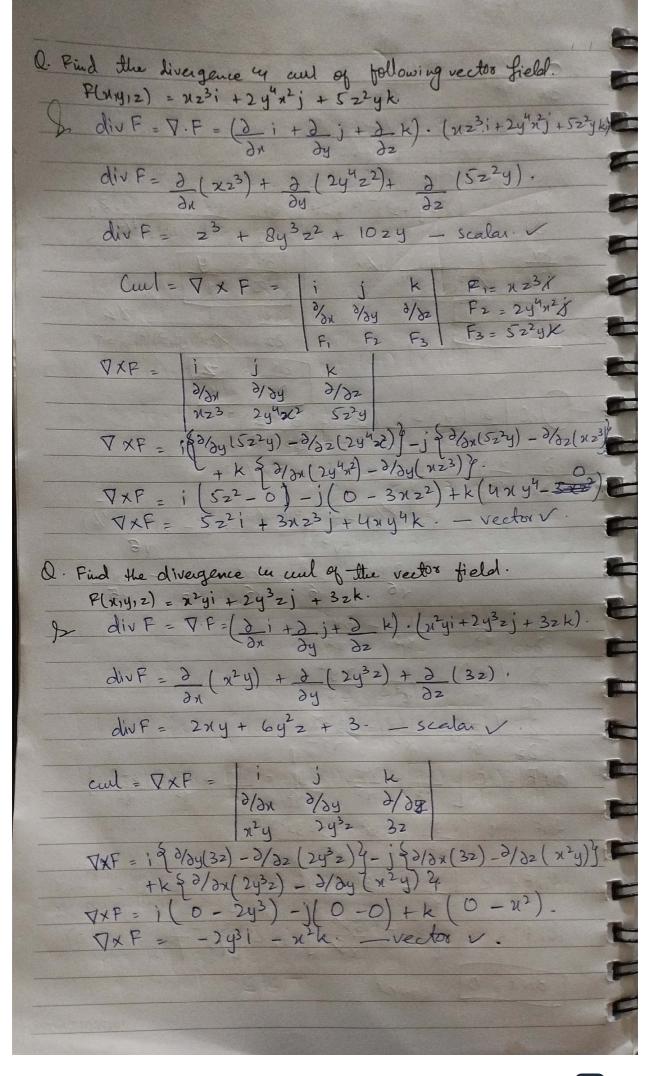
VECTOR FIELD .. F(xxy) - f(xxy)i + g(xxy)j -> 2 space F(x,y,z) = f(x,y) + g(x,y)z)j + h(x,y,z)k -> 3 space Inverse square field. F(8) = C , 8 is radius vector on e 16 a. $||8||^3$ constant $(x+y)^{3/2}$ $(x+y)^{3/2}$ $(x+y)^{3/2}$ $(x+y)^{3/2}$ $(x+y)^{3/2}$ x = x1 + yj + zk = F(x,y,2) = c (xi+ yj+zk) (x+y+2)3/2 Inverse square fields are conservative in any region that does not contain the origin E.g. $\phi(x_1y) = -\frac{c}{(x_1^2+y_1^2)^{1/2}}$ is a potential function $\nabla \phi(x,y) = \frac{\partial \phi}{\partial x} + \frac{\partial \phi}{\partial y} - \frac{c}{(x^2+y^2)^{1/2}} \frac{1}{(x^2+y^2)^{-1/2}}$ $= \frac{Cx}{(x^2+y^2)^{\frac{3}{2}}} \frac{1}{(x^2+y^2)^{\frac{3}{2}}} \frac{1}{(x^2+y^2$ $= \frac{c}{(n^2+y^2)^{3/2}} (ni+yj)$ = F(u,y).Ex. Show that divergence of inverse square field F(x,y,z) = C $(x^2+y^2+z^2)^3/2$ is zero. A let 8 = (x2+y2+22)/2, => (x2+y2+22)/2)3 > 83 $F(x,y,z) = c \qquad (xi+yj+zk)$ $P(x_1,y_1,z) = \frac{cx_1 + cy_1 + cz_1 + cz_1$ div F = V F = (2 i + 2 j + 2 x) (cx i+ cy i+czx) $=>\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z} +$ 2) C d (x) + d (y) + d (z) -





vector field again Q Confirm that "\$" is a potential function or not.

(i) \$\phi(x,y) = 2y^2 + 3n^2y - xy^3\$ F(x,y) = 2xi+ 6yj +8zk If $F = \nabla \phi$, it is a potential function else not $\nabla \phi = (\frac{\partial}{\partial x} + \frac{\partial}{\partial y}) \phi(x, y)$. = \(\frac{1}{2} \) \(\frac{1 $= \frac{\partial}{\partial x} i \left(2y^2 + 3n^2y - xy^3 \right) + \frac{\partial}{\partial y} j \left(2y^2 + 3x^2y - xy^3 \right).$ $\nabla \phi = \left(0 + 6n^4y - \frac{3}{2}y^3 \right) i + \left(4y + 3n^2 - 3xy^2 \right) j.$ F = VO, O is not a potential (ii) \$\phi(x,y,z) = x \sin z + y \sin x + 2 \sin y $F(x_1y_1z) = (\sin z + y \cos x)i + (\sin x + z \cos y)j + (\sin y + n \cos z)k.$ $= \nabla \phi = (\frac{\partial}{\partial i} + \frac{\partial}{\partial z} j + \frac{\partial}{\partial z} k) \phi(x_1y_1z)'$ = 2 (xsinz+ysinx+zsiny)i+ 2 (xsinz+ysinx+zsiny)j + 2 (Xsin 2+ y sin x + 2 sin y) k.

= (Sin2+ y cosx+0) i + (O+ sinx+2 cosy) j + (cos z + O+ siny)k. VØ = (Sinz + 9 cosx) 1 + (Sinx + 2 cosy) 1 + (Siny + x1052) K Since F = VØ, it is a potential function. Consevative cy Non-Consevative fields. F(x14) = f(x14)i+ q(x14)j. if $\frac{\partial f}{\partial y} = \frac{\partial g}{\partial x}$ (conservative) it is valid for 2-space. P(x1412) = f(x1412) i + g(x1412) j + h(x14+2 if TXF=0 (conservative) else non-conservative Los 3-8 pace -Q. Whether the field is conservative or not. (i) F(x1y) = 2xy3 i+ (1+3x2y2)j g(n,y) = 1+3x2y2 $4 + (x_1y) = 2x^4y^3$ 2t = 6 xy2 vector field