Lecture 19 Quiz

1. $\langle y^2z^3, 2xyz^3, 3xy^2z^2 \rangle = F$

$f: \nabla f = F$

$\langle f_x, f_y, f_z \rangle = \langle y^2z^3, 2xyz^3, 3xy^2z^2 \rangle$

$\frac{\partial F_1}{\partial y} = 2yz^3 \quad \frac{\partial F_2}{\partial x} = 2yz^3$ ✓ $\quad \frac{\partial F_3}{\partial x} = 3y^2z^2 \quad \frac{\partial F_1}{\partial z} = 3y^2z^2$ ✓

$\frac{\partial F_2}{\partial z} = 6xyz^2 \quad \frac{\partial F_3}{\partial y} = 6xyz^2$ ✓ $\quad$ It is conservative.

$\frac{\partial F}{\partial x} = y^2z^3 \quad \frac{\partial F}{\partial y} = 2xyz^3 \quad \frac{\partial F}{\partial z} = 3xy^2z^2$

$f = \int y^2z^3 \, dx = xy^2z^3 + g(y,z)$

$\frac{\partial}{\partial y}(xy^2z^3 + g(y,z)) = 2xyz^3$

$2xyz^3 + g'(y,z) = 2xyz^3$

$g'(y,z) \to 0$

$\int 0 \, dy = 0 + g(z)$

$g(z)$ also 0

So $\boxed{f = xy^2z^3}$