Multivar Quiz #6 Saaif Ahmed

Honor Pledge:

"I have neither given nor received any illegal aid on this exam"

-Saaif Ahmed 10/21/20

For the vector field $\mathbf{F}(x, y, z) = \langle y + z, x + z, x + y \rangle$, either show that it is conservative and find a potential function, or else explain why it is not conservative.

$F(x, y, z) = < y + z, x + z, x + y >$

$\vec{F} = \nabla \mathrm{f}$

$\frac{\partial f}{\partial x} = y + z \rightarrow f = xy + xz + g(y, z)$

$\frac{\partial f}{\partial y} = x + z \rightarrow x + g_y = x + z \rightarrow g_y = z \rightarrow g = yz + h(z)$

$\frac{\partial f}{\partial z} = x + y \rightarrow x + g_z = x + y \rightarrow x + y + h_z = x + y \ ; h_z = 0$

$f(x, y, z) = xy + xz + yz$

Test:

$\nabla f = < y + z, x + z, x + y >$

Answer: The vector field is conservative because we found a valid potential function. $f = xy + xz + yz$