Please PRINT your name _____

No calculators, cell phones, computers, notes, etc.

Circle your answer. Make your work correct, complete and coherent.

The quiz is worth 5 points. The solutions will be posted on my website later today.

Quiz 5, October 30, 2018

Find the equation of the plane tangent to $z = \ln(x^2 + y^2)$ at $(1,0,0)$.

ANSWER: Gradients are perpendiuclar to level sets. View the given equation as the level set $0 = \ln(x^2 + y^2) - z$. The gradient of the right side is $\frac{2x}{x^2+y^2}\,\overrightarrow{i} + \frac{2y}{x^2+y^2}\,\overrightarrow{j} - \overrightarrow{k}$. The gradient of the right side at $(1,0,0)$ is $2\,\overrightarrow{i} - \overrightarrow{k}$. The plane through $(1,0,0)$ perpendicular to $2\,\overrightarrow{i} - \overrightarrow{k}$ is

$$\boxed{2(x-1) - z = 0.}$$