

1. TRUE or FALSE: *Briefly justify your answer!*
 - (a) There is a function $P(x, y)$ such that $\frac{\partial P}{\partial x} = y$ and $\frac{\partial P}{\partial y} = x$.
 - (b) There is a function $Q(x, y)$ such that $\frac{\partial Q}{\partial x} = y^2$ and $\frac{\partial Q}{\partial y} = x^2$.
 - (c) If $L(x, y)$ satisfies $\frac{\partial L}{\partial x} = a$ and $\frac{\partial L}{\partial y} = b$, with both a and b constant, then $z = L(x, y)$ is the graph of a plane.
2. Suppose the temperature on a rectangular plate is given by $T(x, y) = k(x^2 + y^2)$, where T is in $^{\circ}F$, x and y are in inches, and k is a constant (with appropriate units). Suppose further that your thermometer is moving at 3 inches per minute in the x -direction, and 2 inches per minute in the y -direction. How fast is the temperature reading changing when the thermometer is at the point $(1, 2)$?