Name _____

Homework 12
Sections 14.4 & 14.5

1. (5) Consider the function $f(x, y)$. If you start at the point $(2, 5)$ and move toward the point $(5, 9)$, the directional derivative is 4. If you start at the point $(2, 5)$ and move toward the point $(6, 2)$, the directional derivative is 7. Find ∇f at $(2, 5)$

2. (5,4,1) The temperature, T, at a point (x, y, z) on a certain surface is given by $T = 4x^2 - y^2 + 16z^2 + 8$.

   (a) Find the rate of change of T at the point $(4, -2, 1)$ in the direction of $2\vec{i} + 6\vec{j} - 3\vec{k}$.

   (b) In what direction does T increase most rapidly at the point $(4, -2, 1)$?

   (c) What is the maximum rate of change?

3. (2,3) At what point(s) on the surface $z = 3 + x^2 + y^2$ is its tangent plane parallel to the following planes?

   (a) $z = 2$

   (b) $z = 8x - 6y + 3$