Name _____

Homework 8
Sections 14.4 & 14.5

1. (4) Compute the gradient of $g(x,y) = 3x - \sin(2x - 2y) + \dfrac{y^2}{x}$ at $\left(\pi, \frac{\pi}{2}\right)$.

2. (5) Find the directional derivative of $f(x,y) = x^2 \ln y - xy^2 + 5x$ at the point $(4,1)$ in the direction of $\vec{v} = 5\vec{i} - 3\vec{j}$.

3. (6) Consider the function $f(x, y) = xy^2 + x - 7y - xy$.

(a) What is the maximum value of $f_{\vec{u}}(5, 3)$?

(b) In which direction (as a unit vector) is $f_{\vec{u}}(5, 3) = 0$?

4. (5) Determine the directional derivative of

$$f(x, y, z) = \frac{x^2 + z^2}{y} + xyz + 5xz^2$$

at $(3, 2, 1)$ in the direction of $\vec{v} = 8\vec{i} + 4\vec{j} + \vec{k}$.