MTH 254

HW #6

1. You are walking through a puddle whose depth in millimeters is given by

$$h = 50 - 2x^2 - 2y^2$$

with x and y in feet (and where "50" and "2" have appropriate units). Your path through the puddle is given by

$$x = 3t$$
 $y = 4t$

with t in seconds (and where "3" and "4" have appropriate units). Your current position is given by x = 3, y = 4.

- (a) At your current position, how fast is the depth of water through which you are walking changing per second?
- (b) At your current position, how fast is the depth of water through which you are walking changing per foot?
- (c) How fast are you walking?
- 2. The temperature of a gas in $^{\circ}F$ is given by $T = 3x^2 5xy + 2y^2z$, with x, y, z in feet. (What are the units of "2", "3", and "5"?)
 - (a) What is the rate of change in the temperature at the point (1, 2, 3) in the direction of $\vec{v} = 2\hat{i} + \hat{j} 2\hat{k}$? Give units!
 - (b) What is the direction of maximum rate of change of temperature at the point (1, 2, 3)? What are the units?
 - (c) What is the maximum rate of change of temperature at the point (1, 2, 3)? Give units!