PS#23

Nueva Multivariable Calculus

- (*This problem is antecedent to the last of the roof architecture problems, which I'll give you on the next problem set*)

  Consider the point $(5, 7)$. Using trig, or complex numbers, or whatever technique you like, rotate it $62.8°$ around the origin (counterclockwise, as usual). What's the new point? (Obviously you should show all your work, too, and explain your method, and draw a bunch of pictures/diagrams.)

  (In the next problem set, I'll ask you to generalize this to any point rotated by any angle; feel free to think about that question on this problem set as well, but don't feel obligated. And of course you could Google a formula, but please do try to figure this out all yourselves! It just takes a bunch of algebra and trig.)

- Suppose the temperature at any point (x, y, z) is given by:

$$T : \mathbb{R}^3 \to \mathbb{R}^1$$

$$T(x, y, z) = 12xyz + 1 \text{ kelvin}$$

  Suppose you're at the point $(1, 1, 1)$. If you want to increase your temperature as fast as possible, in what direction should you move? What's the rate of change of temperature if you move in that direction? If you want to move, but maintain your current temperature, in which direction should you move?