Rec 2:30 3:30

Quiz 5.

1. Let $z = e^{x+2y}$ with $x = s+t^2$, $y = s^2 - t$

Find $\frac{\partial z}{\partial t}$ when $s=1$ $t=2$

Solution: $\frac{\partial z}{\partial t} = \frac{\partial z}{\partial x}\frac{\partial x}{\partial t} + \frac{\partial z}{\partial y}\frac{\partial y}{\partial t}$

$= e^{x+2y}(2t) + 2e^{x+2y}(-1)$

$= e^3(4) - 2e^3 = 2e^3$

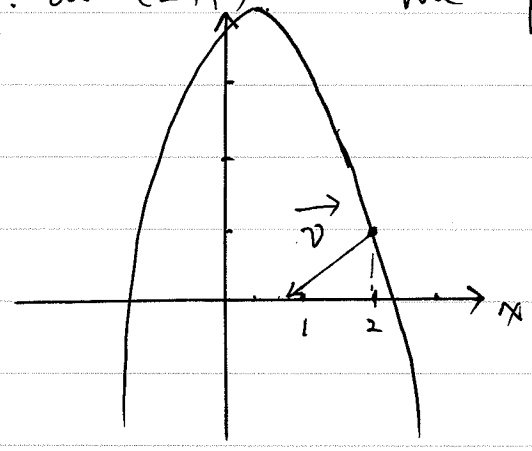
2. Let $f(x,y) = 3x^2 - 2x + 4y^2$ near $(2,1)$

a) Draw the x-y plane, and at $(2,1)$ draw an arrow which shows the direction in which f decreases most rapidly?

b). Indicate in which direction one should go so the rate of change is $-1/2$. at $(2,1)$

We fix $a = \frac{1}{20}$

a).



$f(x,y) = f(2,1) = 12.$

$\nabla f(2,1) = (10, 8).$

$\vec{v} = -\nabla f(2,1)$

b) $D_{\vec{u}}f = \nabla f \cdot \vec{u} = (10,8)\cdot(a,b) = -\frac{1}{2}$

$10a + 8b = -\frac{1}{2}$ $\quad b = -\frac{1}{8}$

(I am sorry that I made a mistake because I forgot to let (a,b) be a unit vector. I choose $a = \frac{1}{20}$ because I want the calculation to be easier for you and hope you to use the formular $D_{\vec{u}}f = \nabla f \cdot \vec{u} = -\frac{1}{2}$.
So I give all of you full marks "5 points" on this problem. I apologize for my mistake and hope you can forgive me)