Math 335 HW 3 **NAME:** _____
Due Wednesday 9/17 5:15pm

Practice Problems *(Do not turn in.)*
Sec 9.5 #1, 9, 23, 29
Sec 9.7 #3, 5, 9, 33, 37, 43

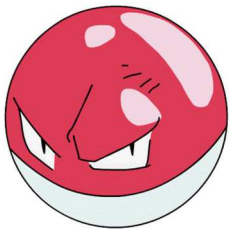
Print out this page and write all answers directly on this worksheet. Show all work. Your answers must be clear and legible. All pages must be stapled.

1.) *[4 points]* Calculate the gradient of $f(x,y,z) = x^2 z - xe^{3y} + \cos(3y - 4z) + 2$.

2.) *[6 points]* Voltorb is standing at the point (2,3) on a mountain range whose height in miles is given by

$$f(x,y) = 3 + x^3y - xy^2$$

where xy are oriented to the standard NESW map directions.



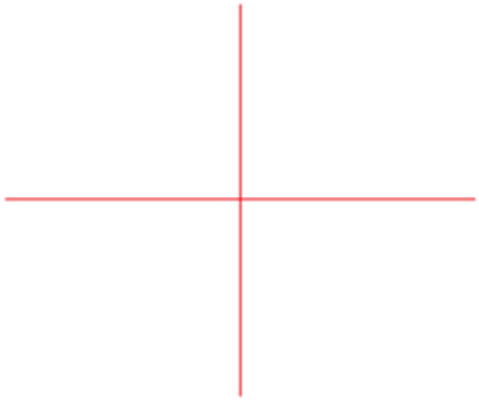
a.) What direction should Voltorb go to proceed *downhill* the fastest? *(Your answer should be a vector.)*

b.) What direction(s) should Voltorb go to stay at the *same height* on the mountain? *(Your answer should be a vector or vectors.)*

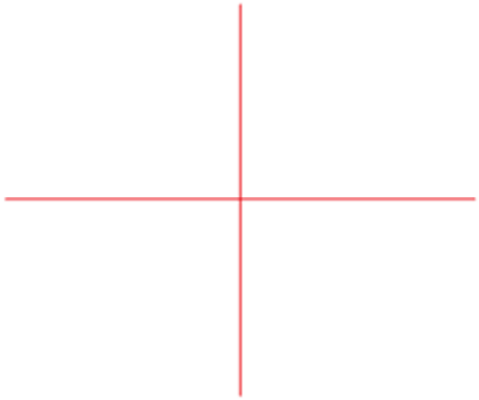
c.) If Voltorb travels due southwest, how steep will his path be? Will he be going uphill or downhill?

3.) *[6 points]* Sketch representative vectors in the given vector field. You may get help from graphing software, such as the Java applet at http://math.la.asu.edu/~kawski/vfa2/

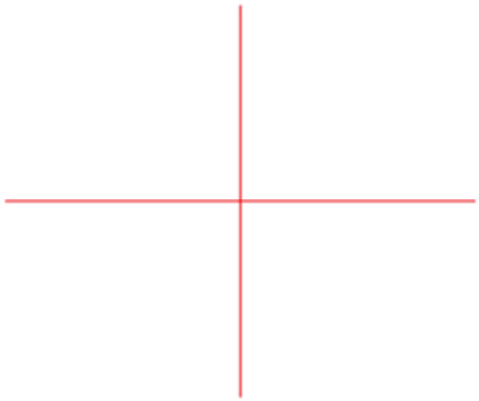
a.) $\vec{F}(x,y) = \langle x, -y \rangle$



b.) $\vec{F}(x,y) = \langle -y, x \rangle$



c.) $\vec{F}(x,y) = \langle y, 0 \rangle$



4.) *[4 points]* Let $\vec{F}(x,y,z) = \left\langle yz\ln x,\ 2x-3yz,\ 4ye^{-z} \right\rangle$.

a.) Compute $\operatorname{div}\vec{F}$.

b.) Compute $\operatorname{curl}\vec{F}$.