

Math 335 HW 3

Due Wednesday 9/17 5:15pm

NAME: _____

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.

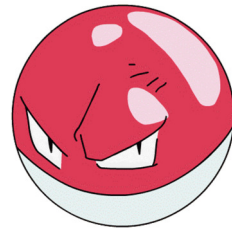
1.) [4 points] Calculate the gradient of $f(x, y, z) = x^2z - xe^{3y} + \cos(3y - 4z) + 2$.

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.)



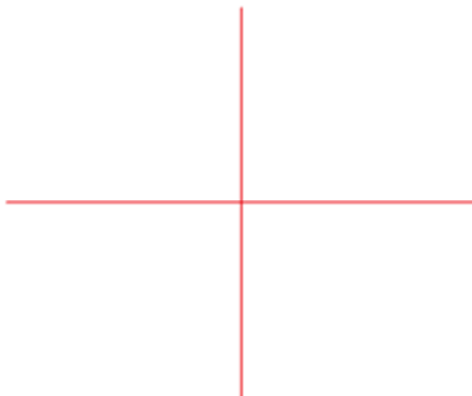
b.) What direction(s) should Voltorb go to stay at the *same height* on the mountain? (Your answer should be a vector or vectors.)

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

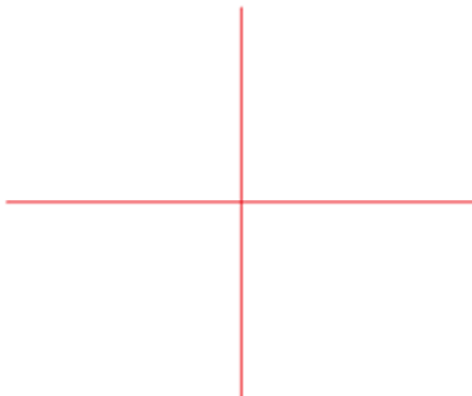
3.) [6 points] Sketch representative vectors in the given vector field. You may get help from graphing software, such as the Java applet at <http://math.la.asu.edu/~kawski/vfa2/>



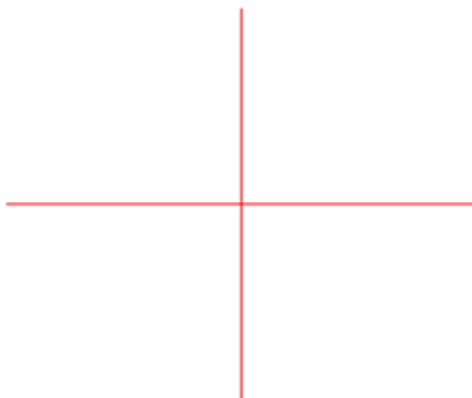
a.) $\vec{F}(x, y) = \langle x, -y \rangle$



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



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



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

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



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