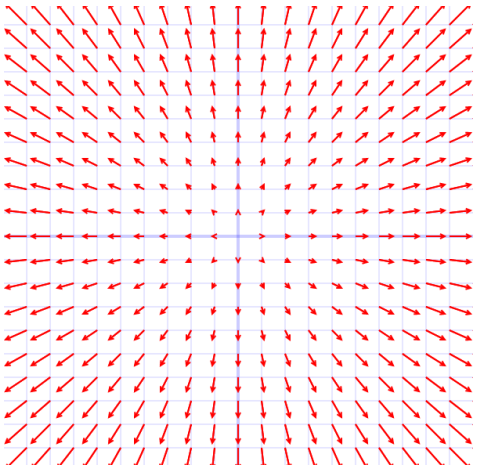
Name: _____

Score: _____ /20

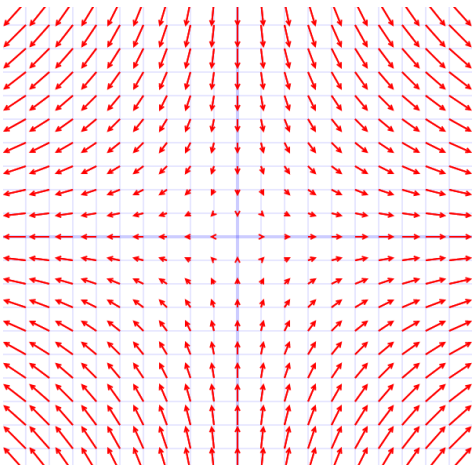
Vector Fields and Applications

Please staple your work and use this page as a cover page.

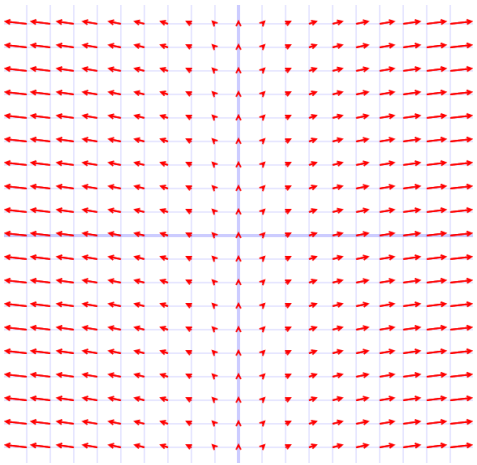
1. Match each plot with one of the vector fields below. Explain how you know you are correct. Images created on https://kevinmehall.net/p/equationexplorer/vectorfield.html.



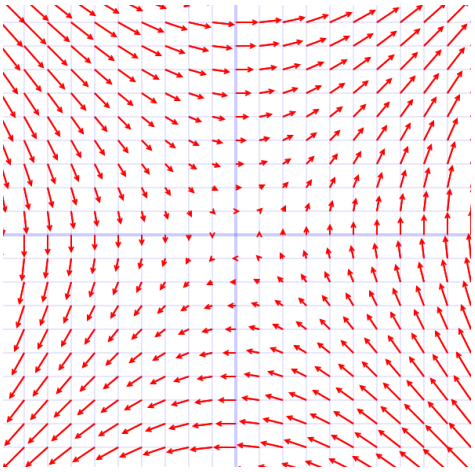
I



II



III

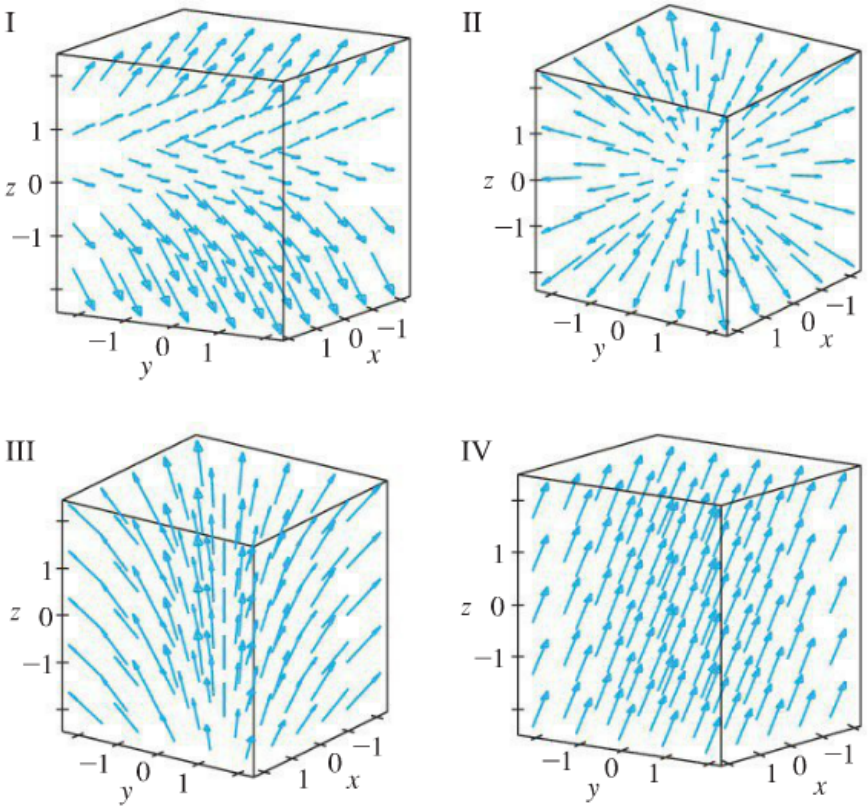


IV

   (a) $\vec{F}(x, y) = \langle y, x \rangle$
   (b) $\vec{F}(x, y) = \langle x, y \rangle$
   (c) $\vec{F}(x, y) = \langle x, -y \rangle$
   (d) $\vec{F}(x, y) = \langle x, 1 \rangle$

2. Sketch a plot and describe a vector field that could be used to represent each of the following situations.
   (a) A proton is located at the origin. Let the vector field represent the force on an electron at a point (x, y).
   (b) An electron is located at the origin. Let the vector field represent the force on another electron at a point (x, y).
   (c) A fluid flows around a drain. The vector field represents the direction of motion and speed.

3. Match each plot with one of the vector fields below. Explain how you know you are correct. Image taken from Stewart (8th Edition).



(a) $\vec{F}(x, y, z) = \langle 1, 2, 3 \rangle$

(b) $\vec{F}(x, y, z) = \langle 1, 2, z \rangle$

(c) $\vec{F}(x, y, z) = \langle x, y, 3 \rangle$

(d) $\vec{F}(x, y, z) = \langle x, y, z \rangle$

4. Could any of the vector fields above represent a gravitational field? If yes, explain why. If not, explain what you could change and why it works.