Math 32 – Workshop #27

1. Set $\vec{\mathbf{r}}(t) = \langle \cos(t), \sin(t) \rangle$.

   (a) Sketch a graph of $\vec{\mathbf{r}}(t)$ in $\mathbb{R}^2$. If a particle is moving along this path, in what direction is it moving?

   (b) On your graph, sketch $\vec{\mathbf{r}}\left(\frac{\pi}{4}\right)$. (*Don't forget how the derivative should be graphed!*)

   (c) Compute $\vec{\mathbf{r}}\left(\frac{\pi}{4}\right) \cdot \vec{\mathbf{r}}\,'\left(\frac{\pi}{4}\right)$. What does this tell you about the relationship between these vectors? (*Note that this is not always the case for a general curve, this curve is special.*)

2. Sketch three different representations of the vector. (*Each answer should look like a picture with three vectors starting at different initial points.*)

   (a) $\vec{\mathbf{v}} = 4\vec{\mathbf{i}} - 2\vec{\mathbf{j}}$

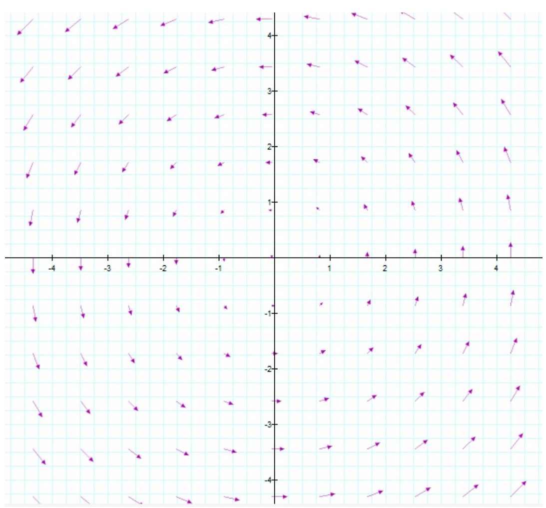
   (b) $\vec{\mathbf{w}} = \langle 1, 2, 3 \rangle$

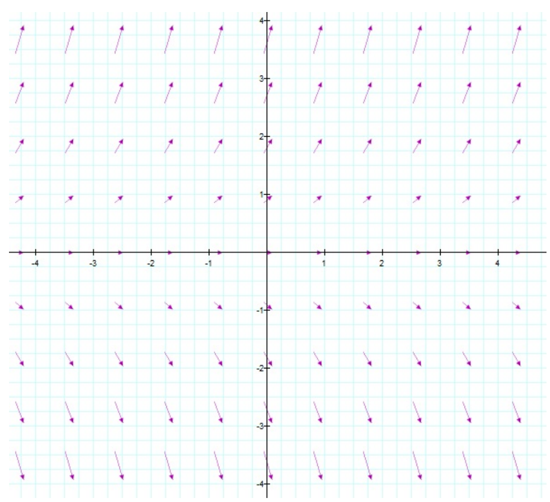
3. Sketch a few of the vectors given by the vector function and determine which vector field matches the function.

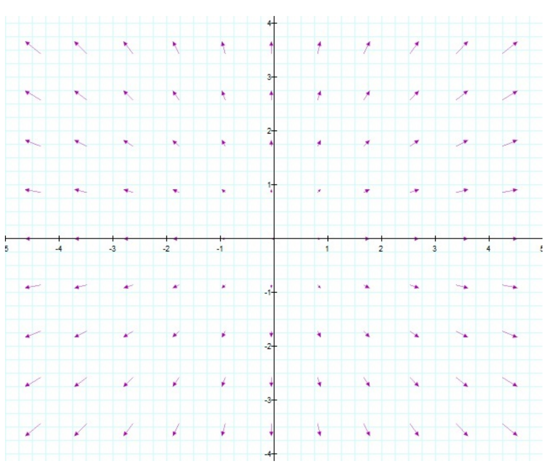
   (a) $\vec{\mathbf{F}}(x, y) = \vec{\mathbf{i}} + y\vec{\mathbf{j}}$

   (b) $\vec{\mathbf{F}}(x, y) = x\vec{\mathbf{i}} + y\vec{\mathbf{j}}$

   (c) $\vec{\mathbf{F}}(x, y) = -y\vec{\mathbf{i}} + x\vec{\mathbf{j}}$







4. Sketch a few of the vectors given by the vector function and determine which vector field matches the function.

   (a) $\vec{\mathbf{F}}(x, y, z) = \vec{\mathbf{i}} + y\vec{\mathbf{j}} + z\vec{\mathbf{k}}$

   (b) $\vec{\mathbf{F}}(x, y, z) = \dfrac{1}{x}\vec{\mathbf{i}} + 2\vec{\mathbf{j}} + z\vec{\mathbf{k}}$

   (c) $\vec{\mathbf{F}}(x, y, z) = 7\vec{\mathbf{j}}$