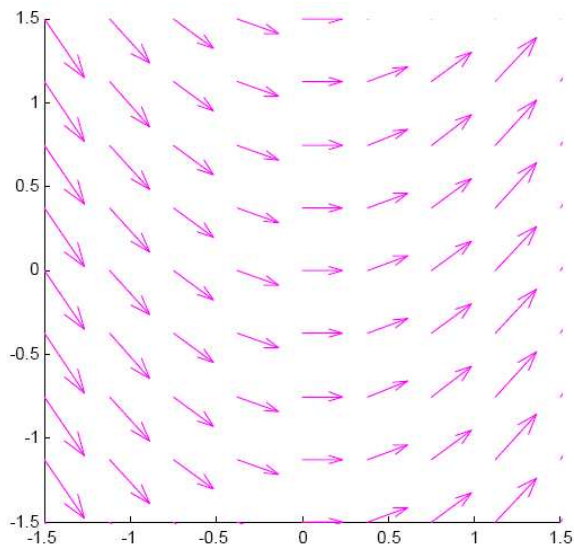


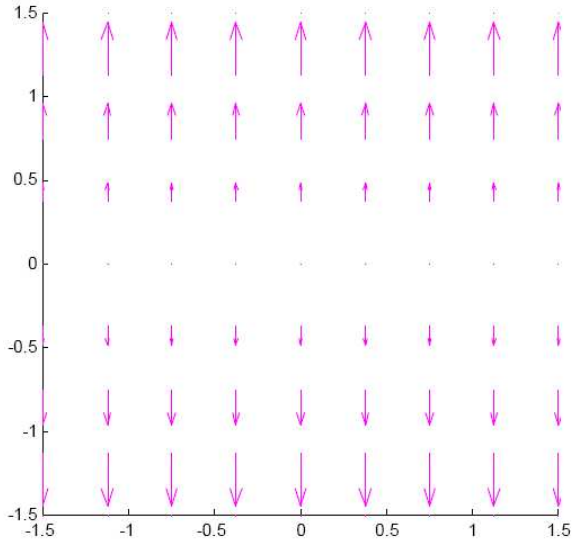
Classroom Voting Questions: Multivariable Calculus

17.4 The Flow of a Vector Field

1. The flow lines for the vector field pictured will be:



- (a) straight lines
 - (b) circles
 - (c) ellipses
 - (d) parabolas
2. The function that describes the distance of a particle from the x -axis as it follows a flow line is:



- (a) linear
 (b) exponential
 (c) sinusoidal
 (d) logarithmic
3. Which parameterized curve is not a flow line of the vector field $\vec{F} = x\hat{i} + y\hat{j}$?
- (a) $\vec{r}(t) = e^t\hat{i} + e^t\hat{j}$
 (b) $\vec{r}(t) = e^t\hat{i} + 2e^t\hat{j}$
 (c) $\vec{r}(t) = 3e^t\hat{i} + 3e^t\hat{j}$
 (d) $\vec{r}(t) = 2e^t\hat{i} + e^{2t}\hat{j}$
4. Which parameterized curves are not flow lines of the vector field $\vec{F} = -y\hat{i} + x\hat{j}$?
- (a) $\vec{r}(t) = \cos t\hat{i} + \sin t\hat{j}$
 (b) $\vec{r}(t) = \cos t\hat{i} - \sin t\hat{j}$
 (c) $\vec{r}(t) = \sin t\hat{i} - \cos t\hat{j}$
 (d) $\vec{r}(t) = 2\cos t\hat{i} + 2\sin t\hat{j}$
5. The path $x = t, y = e^t$ is a flow line of which vector field?
- (a) $\hat{i} + y\hat{j}$
 (b) $\hat{i} + x^2\hat{j}$

- (c) $x\hat{i} + x\hat{j}$
 (d) $y\hat{i} + \hat{j}$
6. An object flowing in the vector field $\vec{F} = y\hat{i} + x\hat{j}$ is at the point $(1, 2)$ at time $t = 5.00$. Estimate the approximate position of the object at time $t = 5.01$.
- (a) $(1.02, 2)$
 (b) $(1.02, 2.01)$
 (c) $(1.01, 2)$
 (d) $(1.01, 2.02)$
7. Two different curves can be flow lines for the same vector field.
- (a) True, and I am very confident
 (b) True, but I am not very confident
 (c) False, but I am not very confident
 (d) False, and I am very confident
8. If one parameterization of a curve is a flow line for a vector field, then all its parameterizations are flow lines for the vector field.
- (a) True, and I am very confident
 (b) True, but I am not very confident
 (c) False, but I am not very confident
 (d) False, and I am very confident
9. If $\vec{r}(t)$ is a flow line for a vector field \vec{F} , then $\vec{r}_1(t) = \vec{r}(t - 5)$ is a flow line of the same vector field \vec{F} .
- (a) True, and I am very confident
 (b) True, but I am not very confident
 (c) False, but I am not very confident
 (d) False, and I am very confident
10. If $\vec{r}(t)$ is a flow line for a vector field \vec{F} , then $\vec{r}_1(t) = \vec{r}(2t)$ is a flow line of the vector field $2\vec{F}$.

- (a) True, and I am very confident
- (b) True, but I am not very confident
- (c) False, but I am not very confident
- (d) False, and I am very confident

11. If $\vec{r}(t)$ is a flow line for a vector field \vec{F} , then $\vec{r}_1(t) = 2\vec{r}(t)$ is a flow line of the vector field $2\vec{F}$.

- (a) True, and I am very confident
- (b) True, but I am not very confident
- (c) False, but I am not very confident
- (d) False, and I am very confident