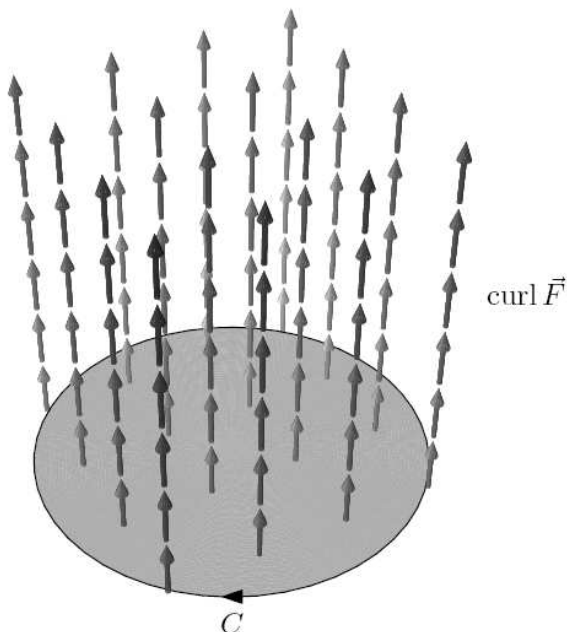


# Classroom Voting Questions: Multivariable Calculus

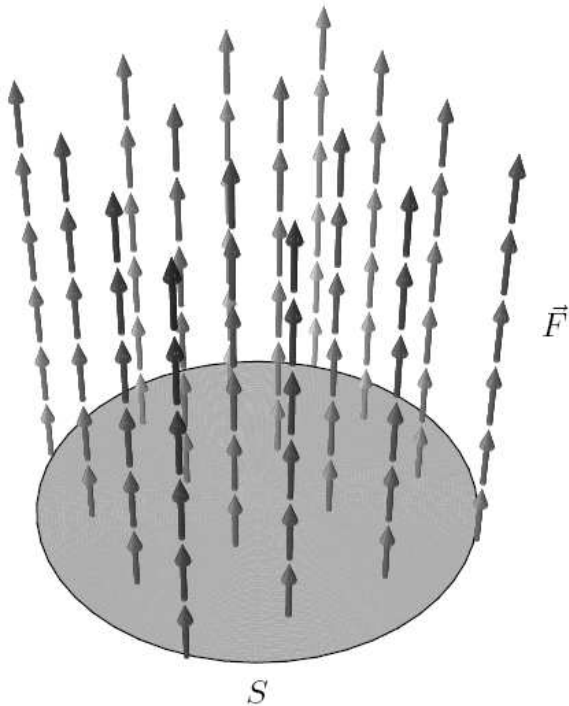
## 20.4 Stokes' Theorem

1. Which of the following facts about  $\vec{F} = \rho\hat{\rho}$  is implied by Stokes' Theorem?
  - (a) The line integral from  $(0,0,0)$  to  $(1,1,1)$  is equal to  $3/2$ .
  - (b)  $\vec{F}$  has positive divergence everywhere.
  - (c) The line integral on any closed curve is zero.
  - (d) The curl of  $\vec{F}$  is non-zero.
2. What can be said about the vector field  $\nabla f$  in terms of curl?
  - (a) Its curl is negative.
  - (b) Its curl is zero.
  - (c) Its curl is positive.
  - (d) Its curl depends on the function  $f$ .
3. The figure below shows the vector field  $\nabla \times \vec{F}$ . No formula for the vector field  $\vec{F}$  is given. The oriented curve  $C$  is a circle, perpendicular to  $\nabla \times \vec{F}$ . The sign of the line integral  $\int_C \vec{F} \cdot d\vec{r}$



- (a) is positive.
- (b) is negative.
- (c) is zero.
- (d) can't be determined without further information.

4. The figure below shows the vector field  $\vec{F}$ . The surface  $S$  is oriented upward and perpendicular to  $\vec{F}$  at every point. The sign of the flux of  $\nabla \times \vec{F}$  through the surface



- (a) is positive.
- (b) is negative.
- (c) is zero.
- (d) can't be determined without further information.

5. The vector field  $\vec{F}$  has curl  $\nabla \times \vec{F} = 3\hat{i} + 4\hat{j} + 2\hat{k}$ . What is the magnitude of the circulation of  $\vec{F}$  around the perimeter of the square with corners at coordinates  $(1,2,3)$ ,  $(4,2,3)$ ,  $(4,2,6)$ , and  $(1,2,6)$ ?

- (a) 0
- (b) 18
- (c) 27
- (d) 36
- (e) 81
- (f) None of the above