Assignment 3

Due date: 2020-02-19, 23:59:59

The due date for submitting the assignment has passed. As per our records, you have not submitted this assignment.

Exercises in spherical coordinate system:

A vector field \( \mathbf{F} \) is expressed in spherical coordinates as

\[
\mathbf{F}(\rho, \theta, \phi) = f(\rho) \mathbf{e}_\rho + g(\theta) \mathbf{e}_\theta + h(\phi) \mathbf{e}_\phi
\]

1. \( \mathbf{F} \) is constant.
   - \( f(\rho) = 0 \)
   - \( g(\theta) = 0 \)
   - \( h(\phi) = 0 \)

   No, the answer is incorrect. Points: 1

   Answer: \( \mathbf{F} \) is constant.

2. The surface integral \( \int \mathbf{F} \cdot d\mathbf{A} \) over the surface of an inverted hemispherical bowl of radius \( R \), resting on the \( xy \) plane and centered at the origin is:

   \[ \frac{1}{2} \pi R^2 \]

   No, the answer is incorrect. Points: 1

   Answer: \( \frac{1}{2} \pi R^2 \)

Cylindrical coordinate system:

A vector field \( \mathbf{F} \) is given in cylindrical coordinate system as

\[
\mathbf{F}(r, \theta, z) = f(r) \mathbf{e}_r + g(\theta) \mathbf{e}_\theta + h(z) \mathbf{e}_z
\]

3. \( \mathbf{F} \) is constant.
   - \( f(r) = 0 \)
   - \( g(\theta) = 0 \)
   - \( h(z) = 0 \)

   No, the answer is incorrect. Points: 1

   Answer: \( \mathbf{F} \) is constant.

4. \( \mathbf{F} \) is constant.
   - \( f(r) = 0 \)
   - \( g(\theta) = 0 \)
   - \( h(z) = 0 \)

   No, the answer is incorrect. Points: 1

   Answer: \( \mathbf{F} \) is constant.

Error delta function:

Choose the correct options for the following integrals involving the Dirac delta function:

5. \( \int_{-\infty}^{\infty} \delta(x) dx = 1 \)
   - A
   - B
   - C
   - D

   No, the answer is incorrect. Points: 1

   Answer: A

6. \( \int_{-\infty}^{\infty} \delta(x-a) dx = 1 \)
   - A
   - B
   - C
   - D

   No, the answer is incorrect. Points: 1

   Answer: A

7. \( \int_{-\infty}^{\infty} \delta(x+1) dx = 1 \)
   - A
   - B
   - C
   - D

   No, the answer is incorrect. Points: 1

   Answer: A

8. \( \int_{-\infty}^{\infty} \delta(x) dx = 1 \)
   - A
   - B
   - C
   - D

   No, the answer is incorrect. Points: 1

   Answer: A