

Unit 2 - Week 1

Course outline

How does an NPTEL online course work?

Week 1

- Vector algebra
- Vector algebra in component form
- Vector triple products
- Vector differential calculus: Gradient
- Divergence
- Curl
- Tutorial on differential vector calculus
- Practice Assignment
- Quiz : Assignment 1
- Week 1 Feedback : Electromagnetism
- Assignment 1 solution

Week 2

Week 3

Week 4

Week 5

Week 6

Week 7

Week 8

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Week 11

Week 12

Download Videos

Lecture materials

Assignment 1

The due date for submitting this assignment has passed. **Due on 2020-02-12, 23:59 IST.**
As per our records you have not submitted this assignment.

Vector calculus: Gradient

Let \vec{R} be the separation vector from a fixed point (x', y', z') to the fixed point (x, y, z) and R be its length.

1) Choose the correct statements from the following: 2 points

$\vec{\nabla}(R^2) = 2\vec{R}$

$\vec{\nabla}(R^2) = \vec{R}$

$\vec{\nabla}(R^2) = 2\hat{R}$

$\vec{\nabla}(R^2) = 2\hat{R}/R$

No, the answer is incorrect.
Score: 0
Accepted Answers:
 $\vec{\nabla}(R^2) = 2\vec{R}$

2) Choose the correct statements from the following: 2 points

$\vec{\nabla}\left(\frac{1}{R}\right) = -\frac{\hat{R}}{R^3}$

$\vec{\nabla}\left(\frac{1}{R}\right) = -2\frac{\hat{R}}{R^2}$

$\vec{\nabla}\left(\frac{1}{R}\right) = \frac{\hat{R}}{R}$

$\vec{\nabla}\left(\frac{1}{R}\right) = -\frac{\hat{R}}{R^2}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
 $\vec{\nabla}\left(\frac{1}{R}\right) = -\frac{\hat{R}}{R^2}$

3) The general formula for $\vec{\nabla}(R^n)$ is 2 points

$n R^{n-1} \vec{R}$

$n R^{n-1} \hat{R}$

$n R^{n/2} \hat{R}$

$(n-1) R^{n-1} \vec{R}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
 $n R^{n-1} \vec{R}$

Divergence and curl

For two vectors given as

$$\vec{v}_a = x^2\hat{x} + 3xz^2\hat{y} - 2xz\hat{z}$$

and

$$\vec{v}_b = xy\hat{x} + 2yz\hat{y} + 3zx\hat{z}$$

4) evaluate the divergence and curl to identify the correct statements from the following: 5 points

$\vec{\nabla} \cdot \vec{v}_a = 0$

$\vec{\nabla} \times \vec{v}_a = 0$

$\vec{\nabla} \cdot \vec{v}_a = 5x$

$\vec{\nabla} \times \vec{v}_a = -2y\hat{x} - 3z\hat{y} - x\hat{z}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
 $\vec{\nabla} \cdot \vec{v}_a = 0$

5) evaluate the divergence and curl to identify the correct statements from the following: 4 points

$\vec{\nabla} \cdot \vec{v}_b = 0$

$\vec{\nabla} \times \vec{v}_b = 0$

$\vec{\nabla} \cdot \vec{v}_b = 5x$

$\vec{\nabla} \times \vec{v}_b = -2y\hat{x} - 3z\hat{y} - x\hat{z}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
 $\vec{\nabla} \times \vec{v}_b = -2y\hat{x} - 3z\hat{y} - x\hat{z}$