

WebAssign**Hw 31 (16.5): Curl and Divergence (Homework)**

Yinglai Wang

MA 261 Fall 2012, section 121, Fall 2012

Instructor: David Daniels

Current Score : 20 / 20**Due :** Tuesday, November 13 2012 11:00 PM EST

1. 2.5/2.5 points | [Previous Answers](#)

SCalcET7 16.5.001.

Consider the given vector field.

$$\mathbf{F}(x, y, z) = (x + yz)\mathbf{i} + (y + xz)\mathbf{j} + (z + xy)\mathbf{k}$$

(a) Find the curl of the vector field.

curl \mathbf{F} =

(b) Find the divergence of the vector field.

div \mathbf{F} =**Need Help?**[Read It](#)[Chat About It](#)

2. 2.5/2.5 points | [Previous Answers](#)

SCalcET7 16.5.003.

Consider the given vector field.

$$\mathbf{F}(x, y, z) = 3xye^z\mathbf{i} + yze^x\mathbf{k}$$

(a) Find the curl of the vector field.

curl $\mathbf{F} =$



Flash Player version 10 or higher is required for this question.

You can [get Flash Player free from Adobe's website](#).



(b) Find the divergence of the vector field.

div $\mathbf{F} =$



Flash Player version 10 or higher is required for this question.

You can [get Flash Player free from Adobe's website](#).



Need Help?

Read It

Chat About It

3. 2.5/2.5 points | [Previous Answers](#)

SCalcET7 16.5.005.

Consider the given vector field.

$$\mathbf{F}(x, y, z) = \frac{\sqrt{x^2 + y^2 + z^2}}{2} (x \mathbf{i} + y \mathbf{j} + z \mathbf{k})$$

(a) Find the curl of the vector field.

curl \mathbf{F} =



Flash Player version 10 or higher is required for this question.

You can [get Flash Player free from Adobe's website](#).



(b) Find the divergence of the vector field.

div \mathbf{F} =



Flash Player version 10 or higher is required for this question.

You can [get Flash Player free from Adobe's website](#).



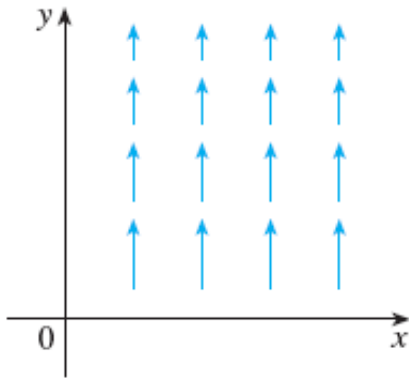
Need Help?

[Read It](#)[Watch It](#)[Chat About It](#)

4. 2.5/2.5 points | [Previous Answers](#)

SCalcET7 16.5.009.

The vector field \mathbf{F} is shown in the xy -plane and looks the same in all other horizontal planes. (In other words, \mathbf{F} is independent of z and its z -component is 0.)



(a) Describe $\text{div } \mathbf{F}$.

- ☐ positive
- ☒ negative
- ☐ zero



(b) In which direction does $\text{curl } \mathbf{F}$ point?

- ☐ positive x
- ☐ negative x
- ☐ positive y
- ☐ negative y
- ☐ positive z
- ☐ negative z
- ☒ none of the above



Need Help?

Read It

Watch It

Chat About It

5. 2.5/2.5 points | [Previous Answers](#)

SCalcET7 16.5.012.

Let f be a scalar field and \mathbf{F} a vector field. Describe each expression.

(a) $\text{curl } f$

- ☐ scalar field
- ☐ vector field
- ☒ not meaningful



(b) $\text{grad } f$

- ☐ scalar field
- ☒ vector field
- ☐ not meaningful



(c) $\text{div } \mathbf{F}$

- ☒ scalar field
- ☐ vector field
- ☐ not meaningful



(d) $\text{curl}(\text{grad } f)$

- ☐ scalar field
- ☒ vector field
- ☐ not meaningful



(e) $\text{grad } \mathbf{F}$

- ☐ scalar field
- ☐ vector field
- ☒ not meaningful



(f) $\text{grad}(\text{div } \mathbf{F})$

- ☐ scalar field
- ☒ vector field
- ☐ not meaningful



(g) $\text{div}(\text{grad } f)$

- ☒ scalar field
- ☐ vector field
- ☐ not meaningful



(h) $\text{grad}(\text{div } f)$

- ☐ scalar field
- ☐ vector field
- ☒ not meaningful



(i) $\text{curl}(\text{curl } \mathbf{F})$

- ☐ scalar field
- ☒ vector field
- ☐ not meaningful



(j) $\text{div}(\text{div } \mathbf{F})$

- ☐ scalar field
- ☐ vector field
- ☒ not meaningful



(k) $(\text{grad } f) \times (\text{div } \mathbf{F})$

- ☐ scalar field
☐ vector field
☒ not meaningful



(I) $\text{div}(\text{curl}(\text{grad } f))$

- ☒ scalar field
☐ vector field
☐ not meaningful



Need Help?

Read It

Chat About It

6. 2.5/2.5 points | [Previous Answers](#)

SCalcET7 16.5.013.MI.

Determine whether or not the vector field is conservative. If it is, find a function f such that $\mathbf{F} = \nabla f$. If the vector field is not conservative, enter NONE.

$$\mathbf{F}(x, y, z) = 7y^2z^3 \mathbf{i} + 14xyz^3 \mathbf{j} + 21xy^2z^2 \mathbf{k}$$

$f(x, y, z) =$



Flash Player version 10 or higher is required for this question.

You can [get Flash Player free from Adobe's website](#).

✓ + K

Need Help?

Read It

Watch It

Master It

Chat About It

7. 2.5/2.5 points | [Previous Answers](#)

SCalcET7 16.5.014.

Determine whether or not the vector field is conservative. If it is, find a function f such that $\mathbf{F} = \nabla f$.
(If the vector field is not conservative, enter DNE.)

$$\mathbf{F}(x, y, z) = xyz^2 \mathbf{i} + x^7 yz^2 \mathbf{j} + x^7 y^2 z \mathbf{k}$$

$$f(x, y, z) =$$



Flash Player version 10 or higher is required for this question.

You can [get Flash Player free from Adobe's website](#).

✓ + K

Need Help?

Read It

Chat About It

8. 2.5/2.5 points | [Previous Answers](#)

SCalcET7 16.5.026.

If f is a scalar field and \mathbf{F} , \mathbf{G} are vector fields, then $f\mathbf{F}$, $\mathbf{F} \cdot \mathbf{G}$, and $\mathbf{F} \times \mathbf{G}$ are defined by the following.

$$(f\mathbf{F})(x, y, z) = f(x, y, z) \mathbf{F}(x, y, z)$$

$$(\mathbf{F} \cdot \mathbf{G})(x, y, z) = \mathbf{F}(x, y, z) \cdot \mathbf{G}(x, y, z)$$

$$(\mathbf{F} \times \mathbf{G})(x, y, z) = \mathbf{F}(x, y, z) \times \mathbf{G}(x, y, z)$$

Find an identical expression, assuming that the appropriate partial derivatives exist and are continuous.

$$\text{curl}(f\mathbf{F})$$

☒ $f \text{ curl } \mathbf{F} + (\nabla f) \times \mathbf{F}$

☐ $f \text{ div } \mathbf{F} + \mathbf{F} \cdot \nabla f$

☐ $\text{grad}(\text{div } \mathbf{F}) - \nabla^2 \mathbf{F}$

☐ $f \text{ div } \mathbf{F} + (\nabla f) \times \mathbf{F}$

☐ none of above



Need Help?

Read It

Chat About It