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HW10 M282 S08 (377779)

About this Assignment

Due: **Fri Jun 13 2008 10:15 PDT**

1. SCalcET5 16.8.008. [349612] Show Details

Use Stokes' Theorem to evaluate $\int_C \mathbf{F}\cdot d\mathbf{r}$. C is oriented counterclockwise as viewed from above.

$\mathbf{F}(x,y,z) = e^{-x}\,\mathbf{i} + e^{x}\,\mathbf{j} + e^{z}\,\mathbf{k}$
C is the boundary of the part of the plane $2x + y + 2z = 2$ in the first octant

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2. SCalcET5 16.8.010. [349604] Show Details

Use Stokes' Theorem to evaluate $\int_C \mathbf{F}\cdot d\mathbf{r}$. C is oriented counterclockwise as viewed from above.

$\mathbf{F}(x,y,z) = x\,\mathbf{i} + y\,\mathbf{j} + (x^2 + y^2)\,\mathbf{k}$
C is the boundary of the part of the paraboloid $z = 1 - x^2 - y^2$ in the first octant

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3. SCalcET5 16.9.004. [349598] Show Details

Verify that the Divergence Theorem is true for the vector field **F** on the region E. (Do this on paper. Your teacher may ask you to turn in this work.) Find $\iint_S \mathbf{F}\cdot d\mathbf{S}$.

$\mathbf{F}(x,y,z) = xz\,\mathbf{i} + yz\,\mathbf{j} + 3z^2\,\mathbf{k}$
E is the solid bounded by the paraboloid $z = x^2 + y^2$ and the plane $z = 1$

$\iint_S \mathbf{F}\cdot d\mathbf{S} =$

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4. SCalcET5 16.9.006. [349652] Show Details

Verify that the Divergence Theorem is true for the vector field **F** on the region E. (Do this on paper. Your teacher may ask you to turn in this work.) Find $\iint_S \mathbf{F}\cdot d\mathbf{S}$.

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

E is the unit ball $x^2 + y^2 + z^2 \leq 1$

$\iint_S \mathbf{F} \cdot d\mathbf{S} =$ ______

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5. SCalcET5 16.9.014. [349662] Show Details

Use the Divergence Theorem to calculate the surface integral $\iint_S \mathbf{F} \cdot d\mathbf{S}$; that is, calculate the flux of $\mathbf{F}$ across S.

$\mathbf{F}(x,y,z) = x^3\,\mathbf{i} + 2xz^2\,\mathbf{j} + 3y^2z\,\mathbf{k}$

S is the surface of the solid bounded by the paraboloid $z = 4 - x^2 - y^2$ and the xy-plane

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6. SCalcET5 16.9.020. [349717] Show Details

Let $\mathbf{F}(x,y,z) = z\tan^{-1}(y^2)\,\mathbf{i} + z^3\ln(x^2 + 1)\,\mathbf{j} + z\,\mathbf{k}$. Find the flux of $\mathbf{F}$ across the part of the paraboloid $x^2 + y^2 + z = 2$ that lies above the plane $z = 1$ and is oriented upward.

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7. HW10.1 [549492] Show Details

Let $P = \dfrac{x-1}{\left((x-1)^2 + (y+3)^2 + z^2\right)^{\frac{3}{2}}}$, $Q = \dfrac{y+3}{\left((x-1)^2 + (y+3)^2 + z^2\right)^{\frac{3}{2}}}$,

$R = \dfrac{z}{\left((x-1)^2 + (y+3)^2 + z^2\right)^{\frac{3}{2}}}$, and let F=(P,Q,R).

______ Find $\displaystyle\int\int_{(x-1)^2+(y+3)^2+z^2=1} F \cdot N dA$ (A numerical answer xx.xx is desired)

______ Find $\displaystyle\int\int_{x^2+y^2+z^2=1} F \cdot N dA$ (A numerical answer xx.xx is desired)

______ Find $\displaystyle\int\int_{x^2+y^2+z^2=12} F \cdot N dA$ (A numerical answer xx.xx is desired)

______ Find $\displaystyle\int\int_{x^2+y^2+z^2=15} F \cdot N dA$ (A numerical answer xx.xx is desired)

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8. HW10.2 [549493] Show Details

Evaluate the following line integrals:

$$(1)\quad \int_{(x-1)^2+(y+3)^2=1,\ z=1} \frac{(y+3)dx+(1-x)dy}{(x-1)^2+(y+3)^2},$$

$$(2)\quad \int_{x^2+y^2=1,\ z=1} \frac{(y+3)dx+(1-x)dy}{(x-1)^2+(y+3)^2},$$

$$(3)\quad \int_{x^2+y^2=8,\ z=8} \frac{(y+3)dx+(1-x)dy}{(x-1)^2+(y+3)^2},$$

$$(4)\quad \int_{x^2+y^2=15,\ z=15} \frac{(y+3)dx+(1-x)dy}{(x-1)^2+(y+3)^2},$$

Numerical answers x.xx are desired:

[ ] (1)
[ ] (2)
[ ] (3)
[ ] (4)

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