Name______________________ ID______________

1-3	/12
4	/ 8
5	/ 8
Total	/28

MATH 251 Quiz 7 Fall 2005

Sections 503 P. Yasskin

Multiple Choice: (4 points each)

1. (4 points) If $\vec{F} = (x\sin y, z\cos y, x^2 + z^2)$, compute $\vec{\nabla} \cdot \vec{F}$.

- **a.** $(\sin y, -z\sin y, 2z)$
- **b.** $(-\cos y, -2x, -x\cos y)$
- **c.** $(-\cos y, 2x, -x\cos y)$
- **d.** $-\cos y - 2x - x\cos y$
- **e.** $\sin y - z\sin y + 2z$

2. (4 points) If $\vec{F} = (x\sin y, z\cos y, x^2 + z^2)$, compute $\vec{\nabla} \times \vec{F}$.

- **a.** $(\sin y, -z\sin y, 2z)$
- **b.** $(-\cos y, -2x, -x\cos y)$
- **c.** $(-\cos y, 2x, -x\cos y)$
- **d.** $-\cos y - 2x - x\cos y$
- **e.** $\sin y - z\sin y + 2z$

3. (4 points) If $\vec{F} = (x\sin y, z\cos y, x^2 + z^2)$, compute $\vec{\nabla} \cdot \vec{\nabla} \times \vec{F}$.

- **a.** 0 Correct Choice
- **b.** $-z\cos y + 2$
- **c.** $z\cos y + 2$
- **d.** $(x\sin y, -\cos y, -2 - \sin y)$
- **e.** $(x\sin y, \cos y, -2 - \sin y)$

4. (8 points) Compute $\iint \vec{F}\,d\vec{S}$ over the sphere $x^2+y^2+z^2=4$ with an outward normal for the vector field $\vec{F}=(3x,3y,6z)$.

Note: The sphere may be parametrized by $\vec{R}(\theta,\varphi)=(2\sin\varphi\cos\theta,2\sin\varphi\sin\theta,2\cos\varphi)$.
Follow these steps:

$\vec{e}_\theta =$

$\vec{F}\left(\vec{R}(\theta,\varphi)\right) =$

$\vec{e}_\varphi =$

$\vec{N} =$

$\vec{F}\cdot\vec{N} =$

$\iint \vec{F}\,d\vec{S} =$

5. (8 points) Compute $\iint \vec{\nabla}\times\vec{F}\,d\vec{S}$ over the cone $z=\sqrt{x^2+y^2}$ for $z\le 3$ with normal pointing up and in, for the vector field $\vec{F}=(3y,-3x,6xy)$.

Note: The cone may be parametrized by $\vec{R}(r,\theta)=(r\cos\theta,r\sin\theta,r)$. Follow these steps:

$\vec{e}_r =$

$\vec{\nabla}\times\vec{F} =$

$\vec{e}_\theta =$

$\vec{N} =$

$\vec{\nabla}\times\vec{F}\left(\vec{R}(r,\theta)\right) =$

$\vec{\nabla}\times\vec{F}\cdot\vec{N} =$

$\iint \vec{\nabla}\times\vec{F}\,d\vec{S} =$