Fake Quiz 2 Calc 3 11/30/2011

This is a fake quiz, this is *only* a fake quiz. In the event of an actual quiz, you'd have been given fair warning. Repeat: This is *only* a fake quiz.

1. Compute $\int_C \left(x^2+y^2\right)dx - x\,dy$ along the quarter circle from (1,0) to (0,1).

Integrate the long way to get $-1-\pi/4$.

2. Evaluate $\iint_S \nabla\times\mathbf{F}\cdot\mathbf{n}\,d\sigma$ for the hemisphere S: $x^2+y^2+z^2=9$, $z\geq 0$ and the field $\mathbf{F}=y\mathbf{i}-x\mathbf{j}$.

Use Stokes' Theorem to get -18π.

3. Evaluate $\int \left(\sin y\sinh x+\cos y\cosh x\right)dx+\left(\cos y\cosh x-\sin y\sinh x\right)dy$ where C is the line segment from (1,0) to $(2,\pi/2)$.

Integrate using the Fundamental Theorem for Line Integrals (the potential function is $f = \sin y\cosh x + \cos y\sinh x$) to get $\cosh 2 - \sinh 1$.

4. Evaluate $\iint_S \mathbf{F}\cdot\mathbf{n}dS$, where $\mathbf{F}(x,y,z) = 4x\mathbf{i} - 3y\mathbf{j} + 7z\mathbf{k}$ and S is the surface of the cube bounded by the coordinate planes and the planes $x = 1$, $y = 1$, and $z = 1$.

Integrate using the Divergence Theorem to get 8.

5. Evaluate , $\iint_S \mathbf{F}\cdot\mathbf{n}dS$ where $\mathbf{F}(x,y,z) = x\,\mathbf{i} + y\,\mathbf{j} + 2z\,\mathbf{k}$ and S is the portion of the cone $z^2 = x^2 + y^2$ between the planes $z = 1$ and $z = 2$, oriented upwards.

Integrate the long way to get $14\pi/3$.

6. Evaluate $\int_C \left(x^2-y\right)dx + x\,dy$, where C is the circle $x^2 + y^2 = 4$ with counterclockwise orientation.

Use Green's Theorem to get 8π.

7. Evaluate $\iint_S \left\langle x^3, x^2y, xy\right\rangle\cdot d\mathbf{S}$, where S is the surface of the solid bounded by $z = 4 - x^2$, $y + z = 5$, $z = 0$, and $y = 0$.

Use the Divergence Theorem to get 4608/35.

8. Compute $\int_C \mathbf{F}\cdot d\mathbf{r}$ where $\mathbf{F}(x,y,z) = y\,\mathbf{i} + z\,\mathbf{j} - x\,\mathbf{k}$ and C is the line segment from (1,1,1) to (-3,2,0).

Integrate the long way to get -13/2.

9. Compute $\int_C \left\langle \ln(1+y), -\frac{xy}{1+y} \right\rangle \cdot d\mathbf{r}$ where C is the triangle with vertices (0,0), (2,0), and (0,4).

Use Green's Theorem to get –4.

10. Evaluate $\int_{(0,1)}^{(\pi,-1)} y \sin x \, dx - \cos x \, dy$.

Use the Fundamental Theorem for Line Integrals (the potential function is $f = -y \cos x$) to get 0.

11. Compute , $\iint_S \mathbf{F} \cdot \mathbf{n} dS$ where $\mathbf{F}(x,y,z) = 2y\,\mathbf{j} + \mathbf{k}$ and S is the portion of the paraboloid $z = x^2 + y^2$ below the plane $z = 4$ with positive orientation.

Use the long way to get -12π.

12. Compute $\int_C \mathbf{F} \cdot d\mathbf{r}$ where $\mathbf{F}(x,y,z) = \langle 4x, 7y, -3z \rangle$ and C is the boundary of the first-octant portion of a sphere with radius 5 (centered at the origin).

Use Stokes' Theorem to conclude that, since curl **F** is 0, the surface integral (and hence the line integral) is 0.