

## Fake Quiz 4      Calc 3      11/16/2007

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

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

2. Evaluate  $\int_C (\sin y \sinh x + \cos y \cosh x) dx + (\cos y \cosh x - \sin y \sinh x) dy$  where C is the line segment from (1,0) to  $(2, \frac{\pi}{2})$ .

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

3. 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.

4. 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  $14\pi/3$ .

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

Use Green's Theorem to get  $8\pi$ .

6. Evaluate  $\iint_S \langle x^3, x^2y, xy \rangle \cdot d\mathbf{S}$ , 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  $4608/35$ .

7. 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  $-13/2$ .

8. 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  $-4$ .

9. 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.

10. 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  $-12\pi$ .