

## Quiz 10

Math 114 - Calculus II

November 19, 2008

Name: \_\_\_\_\_ SOLUTIONS \_\_\_\_\_

**Note:** *In order to receive full credit, you must show work that justifies your answer.*

1. Compute the integral  $\int_R \left(1 + \frac{y}{2}\right) dA$ , where  $R$  is the triangular region in the  $xy$ -plane bounded by the vertices  $(0, 0)$ ,  $(1, 0)$ , and  $(3, 2)$ .

$$\begin{aligned} \int_0^2 \int_{3y/2}^{y+1} \left(1 + \frac{y}{2}\right) dx dy &= \int_0^2 \left(1 + \frac{y}{2}\right) x \Big|_{x=3y/2}^{x=y+1} dy \\ &= \int_0^2 \left(1 + \frac{y}{2}\right) \left(1 - \frac{y}{2}\right) dy = \int_0^2 \left(1 - \frac{y^2}{4}\right) dy \\ &= \left[y - \frac{y^3}{12}\right]_0^2 = \frac{4}{3} \end{aligned}$$

2. Compute the volume of the region bounded by the surfaces  $z = 3 + \sin y$ ,  $z = -3 + \sin y$ ,  $x = 1$ ,  $x = -1$ ,  $y = 0$ , and  $y = \pi/2$ .

$$\begin{aligned} V &= \int_{-1}^1 \int_0^{\pi/2} ((3 + \sin y) - (-3 + \sin y)) dy dx \\ &= \int_{-1}^1 \int_0^{\pi/2} 6 dy dx = 6 \left(\frac{\pi}{2}\right) (2) = 6\pi \end{aligned}$$

## Quiz 10

Math 114 - Calculus II

November 21, 2008

Name: \_\_\_\_\_ SOLUTIONS \_\_\_\_\_

**Note:** *In order to receive full credit, you must show work that justifies your answer.*

1. Compute the volume of the region in the first quadrant bounded by the plane  $x + y + z = 6$ .

$$\begin{aligned} V &= \int_0^6 \int_0^{6-x} (6 - x - y) \, dy dx = \int_0^6 \left[ 6y - xy - \frac{1}{2}y^2 \right]_{y=0}^{y=6-x} dx \\ &= \int_0^6 \left( \frac{1}{2}x^2 - 6x + 18 \right) dx = \left[ \frac{1}{6}x^3 - 3x^2 + 18x \right]_0^6 = 36 \end{aligned}$$

2. Compute  $\int_0^1 \int_y^1 e^{x^2} dx dy$ . (Hint: Try reversing the order of integration.)

$$\begin{aligned} \int_0^1 \int_y^1 e^{x^2} dx dy &= \int_0^1 \int_0^x e^{x^2} dy dx \\ &= \int_0^1 x e^{x^2} dx = \frac{1}{2} e^{x^2} \Big|_0^1 = \frac{e-1}{2} \end{aligned}$$