

Homework and Quiz 11

Due Monday, July 20, 2009

Ungraded homework

For practice, do

Section 16.4, page 1014, problems 7, 9, 11, 15, 19, 21, 29.

Section 16.5, page 1024, problems 3, 5.

Section 16.6, page 1034, problems 3, 5, 7, 9, 11, 15, 19, 21, 29.

Section 16.7, page 1040, problems 3, 9, 15, 17, 27.

I am not going to emphasize the material in section 16.5. On the other hand, section 16.4 is extremely important (as it is the first example of *change of coordinates*).

Graded Quiz

(a) Evaluate the integral

$$\int_{x=-1}^1 \int_{y=-\sqrt{1-x^2}}^{\sqrt{1-x^2}} xy \, dy \, dx$$

by converting it into polar coordinates.

(b) Find the volume of the region

$$R = \{(x, y, z) \in \mathbb{R}^3 : 0 \leq z \leq 18 - 2x^2 - 2y^2\}.$$

(c) Let $S = \{(x, y, z) \in \mathbb{R}^3 : x^2 + y^2 + z^2 \leq R\}$, and

$$H = \{(x, y, z) \in \mathbb{R}^3 : x^2 + y^2 \geq r\}.$$

Compute the volume of $S \cap H$. Your answer will depend on R and r .

(d) Evaluate the following:

$$\int_{x=0}^1 \int_{y=0}^2 \int_{z=0}^3 xyz \, dz \, dy \, dx$$

(e) Evaluate $a = \iiint_R x \, dV$, $b = \iiint_R y \, dV$, and $c = \iiint_R z \, dV$ where

$$R = \{(x, y, z) \in \mathbb{R}^3 : x \geq 0, y \geq 0, z \geq 0, 2x + 2y + z \leq 4\}.$$

Then the point (a, b, c) is the center of mass of the tetrahedron R .