Math 217 Assignment 6

Due Friday October 30

■ **Problems from the text (do NOT turn in these problems):**

- Section 16.1: 8–14.
- Section 16.2: 15–31, 35–36.
- Section 16.3: 7–28, 31–34, 39–50, 55–56, 59–61.
- Section 16.4: 7–35.

■ **Problems to turn in:**

1. Using a Riemann sum with four rectangles and choosing the sample points to be the lower right corners, approximate the volume of the solid that lies below the surface $z = x + 2y^2$ and above the domain $D = [0, 2] \times [0, 4]$. What would your answer be if you use the midpoint rule to estimate the same volume?
2. Find the volume of each of the solids described below:
   (a) in the first octant bounded by the cylinder $z = 16 - x^2$ and the plane $y = 5$.
   (b) bounded by the planes $z = x$, $y = x$, $x + y = 2$ and $z = 0$.
   (c) bounded by the cylinders $x^2 + y^2 = r^2$ and $y^2 + z^2 = r^2$.
   (d) bounded by the paraboloids $z = 3x^2 + 3y^2$ and $z = 4 - x^2 - y^2$.
3. Calculate the double integrals:
   (a) $\displaystyle\iint_R \frac{1 + x^2}{1 + y^2} dA, \qquad R = \{(x, y) : 0 \le x \le 1, 0 \le y \le 1\},$
   (b) $\displaystyle\iint_D (x + y)\, dA, \qquad D$ is bounded by $y = \sqrt{x}$ and $y = x^2$,
   (c) $\displaystyle\int_0^2 \int_0^{\sqrt{2x - x^2}} \sqrt{x^2 + y^2}\, dy\, dx.$
4. For each of the two problems below, sketch the region of integration and reverse the order of integration. For the second problem, evaluate the resulting integral.
   (a) $\displaystyle\int_0^1 \int_{arctan(x)}^{\frac{\pi}{4}} f(x, y)\, dy\, dx \qquad$ (b) $\displaystyle\int_0^1 \int_x^1 e^{\frac{x}{y}} dy\, dx.$
5. (a) A cylindrical drill with radius r_1 is used to bore a hole through the center of a sphere of radius r_2. Find the volume of the ring-shaped solid that remains.
   (b) Express the volume in part (a) in terms of the height h of the ring. Notice that the volume depends on r_1 and r_2 only through h.