Problem Set 17

1. Evaluate the iterated integral $\int_0^1 \int_{x^2}^{x} (1 + 2y) dy \cdot dx$.

2. Evaluate the double integral $\iint \frac{y}{x^5+1} dA$ for D = {(x,y) | $0 \le x \le 1$, $0 \le y \le x^2$}

3. Evaluate the double integral $\iint (x^2 + 2y) dA$ if D is bounded by y = x, $y = x^3$, $x \ge 0$.

4. Find the volume under the surface $z = 1 + x^2y^2$ and above the region enclosed by $x = y^2$ and x = 4.

5. Sketch the solid whose volume is given by the iterated integral
$\int_0^1 \int_0^{1-x} (1 - x - y) dy \cdot dx$.

6. Sketch the region whose area is given by the integral $\int_{\pi/4}^{3\pi/4} \int_1^2 r \cdot dr \cdot d\theta$ and evaluate the integral.

7. By changing to polar coordinates, evaluate the integral $\iint e^{-x^2-y^2} \cdot dA$ in the region bounded by the semicircle $x = \sqrt{4 - y^2}$ and the y-axis.

8. Use a double integral to find the area of the region inside the circle $(x - 1)^2 + y^2 = 1$ and outside the circle $x^2 + y^2 = 1$.

9. Use polar coordinates to find the volume below the paraboloid $z = 18 - 2x^2 - 2y^2$ and above the x-y plane.

10. Evaluate the iterated integral $\int_0^1 \int_y^{\sqrt{2-y^2}} (x + y) dx \cdot dy$.