# Take-Home Quiz 6:
Double and triple integrals (§13.2, 13.4-13.5)

Directions: This quiz is due on March 13, 2017 at the beginning of lecture. You may use whatever resources you like – e.g., other textbooks, websites, collaboration with classmates – to complete it **but YOU MUST DOCUMENT YOUR SOURCES**. Acceptable documentation is enough information for me to find the source myself. Rote copying another's work is unacceptable, regardless of whether you document it.

1. **13.2 #70** Find the volume of the solid above the parabolic region

$$R = \{(x, y) \mid 0 \le x \le 1,\, 0 \le y \le 1 - x^2\}$$

   and between the planes $z = 1$ and $z = 2 - y$ (see figure).
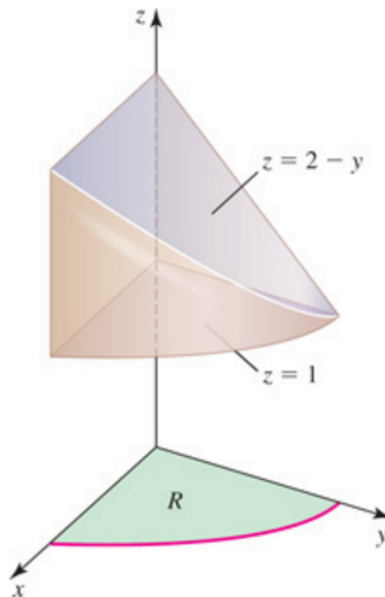
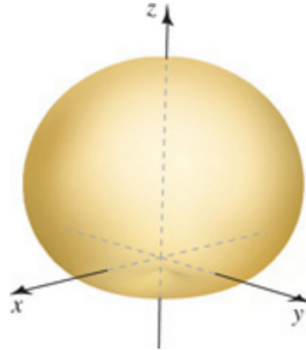2. **13.4 #50** Use another order of integration to evaluate

$$\int_1^4 \int_z^{4z} \int_0^{\pi^2} \frac{\sin\sqrt{yz}}{x^{\frac{3}{2}}} \, dy \, dx \, dz.$$

3. **13.5 #16** Use cylindrical coordinates to evaluate

$$\int_0^3 \int_{-\sqrt{9-y^2}}^{\sqrt{9-y^2}} \int_0^{9-3\sqrt{x^2+y^2}} dz \, dx \, dy.$$

4. **13.5 #48** Use spherical coordinates to find the volume of the solid cardiod of revolution (see figure)

$$D = \{(\rho, \varphi, \theta) \mid 0 \leq \rho \leq 1 + \cos\varphi, \ 0 \leq \varphi \leq \pi, \ 0 \leq \theta \leq 2\pi\}.$$

5. **13.5 #76** Before a gasline-powered engine is started, water must be drained from the bottom of the fuel tank (see figure). Suppose the tank is a right circular cylinder on its side with a length of 2 ft and a radius of 1 ft. If the water level is 6 in above the lowest part of the tank, determine how much water must be drained from the tank.