$\rm MTH~254$

HW #3

- WARMUP (Do not turn in this problem but see me if you need help.)
 Write down a triple integral representing the volume of a slice of the cylindrical cake of height 2" and radius 5" between the planes φ = π/6 and φ = π/3. Evaluate this integral.
- 1. Suppose W is the region *outside* the cylinder $x^2+y^2 = 1$ and *inside* the sphere $x^2+y^2+z^2 = 2$. Calculate

$$\int\limits_{W} \left(x^2 + y^2 \right) \, dV$$

2. The voltage V (in volts) across a circuit is given by V = IR (Ohm's Law), where I is the current (in amps) flowing through the circuit and R is the resistance (in ohms). If we place two circuits, with resistance R_1 and R_2 , in parallel, then their combined resistance R is given by

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$$

Suppose the current is 2 amps and increasing at 10^{-2} amp/sec and R_1 is 3 ohms and increasing at 0.5 ohm/sec, while R_2 is 5 ohms and decreasing at 0.1 ohm/sec. Calculate the rate at which the voltage is changing.