1. (1 pt) Electric charge is distributed over the disk $x^2 + y^2 \leq 16$ so that the charge density at $(x,y)$ is $\sigma(x,y) = 1 + x^3 + y^2$ coulombs per square meter. Find the total charge on the disk.

2. (1 pt) A lamina occupies the part of the disk $x^2 + y^2 \leq 9$ in the first quadrant and the density at each point is given by the function $\rho(x,y) = 2(x^2 + y^2)$.  
A. What is the total mass? 
B. What is the moment about the x-axis? 
C. What is the moment about the y-axis? 
D. Where is the center of mass? ( , ) 
E. What is the moment of inertia about the origin? 

3. (1 pt) A lamp has two bulbs, each of a type with an average lifetime of 3 hours. The probability density function for the lifetime of a bulb is $f(t) = \frac{4}{3}e^{-t/3}, t \leq 0$. What is the probability that both of the bulbs will fail within 3 hours?

4. (1 pt) You are getting married and your dearest relative has baked you a cake which fills the volume between the two planes, $z = 0$ and $z = 2 + 6y + c$, and inside the cylinder $x^2 + y^2 = 1$. You are to cut it in half by making two vertical slices from the center outward. Suppose one of the slices is at $\theta = 0$ and the other is at $\theta = \psi$. What is the limit, $\lim_{c \to \infty}$?