Calc II - Review for exam II

The second exam will be this Friday, March 4. We will discuss some of these problems in class on Wednesday, but you should work them all out to the best of your ability prior to that. Understanding the problems on this sheet will help you greatly on the exam.

1. Let $f(x) = e^{2x}$. Write down an integral representing the length of the graph of f over the interval $[-2, 2]$.
2. Let $f(x) = e^{2x}$. Suppose we spin the region between the graph of f over the interval $[-2, 2]$ about the x-axis. Find the volume of the resulting solid of revolution.
3. Let $f(x) = e^{2x}$. Suppose we spin the region between the graph of f over the interval $[0, 2]$ about the y-axis. Find the volume of the resulting solid of revolution.
4. Suppose I need to exert a force of 15 N to stretch a spring 0.35 meters past its natural length. How much work does it take to get it there from its natural postion?
5. Suppose I pull a 12 pound bucket from a well that's 24 feet deep with a rope that weighs 0.5 pounds per foot. How much work does that process take?
6. Find the center of mass of a bar that stretches from $x = 0$ to $x = 3$ and whose density is
$$\rho(x) = \frac{1}{2}x + 1.$$
7. Use u-substitution to translate the following normal integral into a standard normal integral:
$$\frac{1}{\sqrt{2\pi}\,2}\int_{-2}^{3} e^{-(x+1)^2/8}dx.$$
8. I've got an unfair coin that comes up heads 3/4 of the time. Suppose I flip that coin 800 times, count the number of heads I get, and call that value S.
   (a) Find $E(S)$ - i.e. the mean or expectation of S.
   (b) Find $\sigma^2(S)$ and $\sigma(S)$ - i.e. the variance and standard deviation of S
   (c) Write down a normal integral that represents $P(590 < S < 620)$.
9. I've got a 6 sided die with
   - Three sides labeled 1,
   - two sides labeled 2, and
   - one side labeled 5.

   Let X denote the numerical value of 1 roll and let S the sum of the numerical values of 200 rolls.
   (a) Find $E(X)$ and $\sigma(X)$.
   (b) Find $E(S)$ and $\sigma(S)$.
   (c) Write down a normal integral representing $P(S < 420)$
10. Suppose that a generalized cone has a base with area 18π and height 4. Find a function $A(z)$ that tells you the cross-sectional area of that cone and integrate that function to show that its volume is 24π.

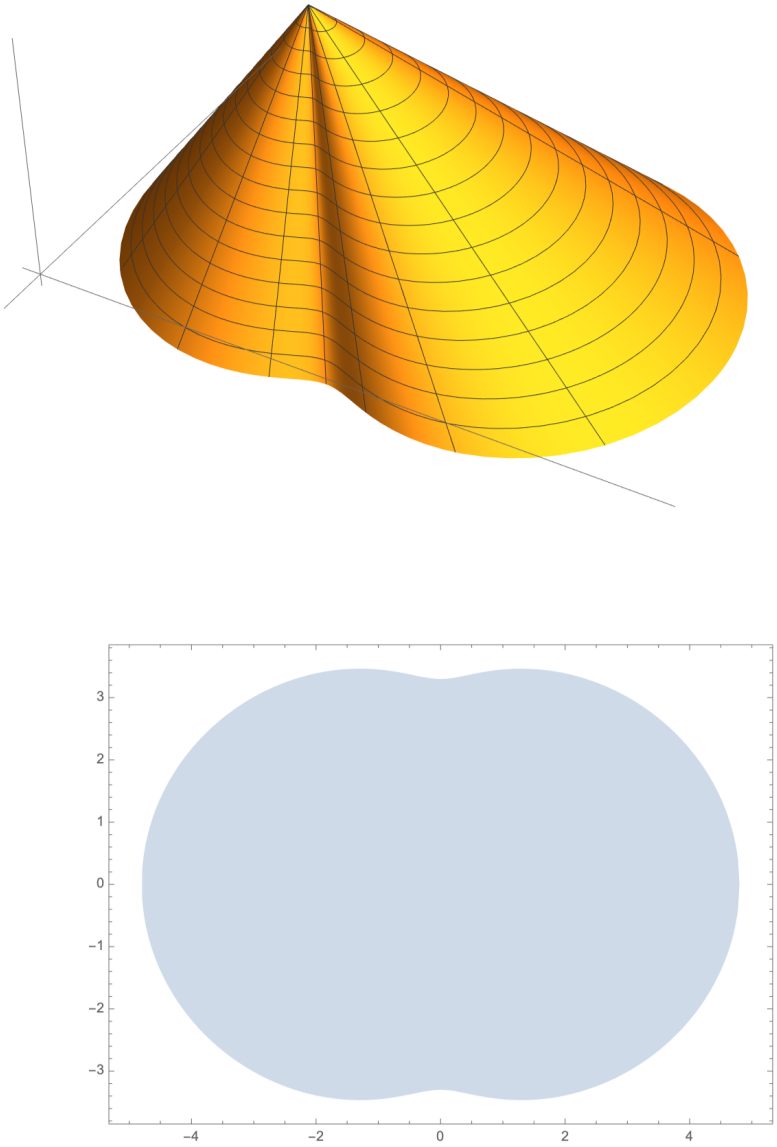

Figure 1: A generalized cone