Worksheet week 7 - MAC 2312, Spring 2015 **NAME:** _____

0. (1 pt) Write your score for the Worksheet assigned on Feb. 3.

1. (4 pts) Suppose you have to drill a narrow but deep pit into the ground. The pit is cylindrical, with a radius of 1ft and with a depth of 1000ft. The density of the rock encountered varies, so assume that at a depth of x ft from the ground, the density is given by some function $\rho(x)$ lbs/ft^3.

(a) (2 pts) Write a formula to express the total mass of the material removed during drilling.

(b) (2 pts) Write a formula to express the total work done in removing the drilled material to the ground level.

2. (6 + 1 pts) Use integration by parts to evaluate each integral (3 pts each)
Hint: In each case, apply IBP twice and look for the original integral to appear again in the process.

For an additional bonus point, instead of (b) do (b') $\int e^{ax}\sin(bx)\,dx$

(a) $\int \cos(\ln x)\,dx$

(b) $\int e^{3x}\sin x\,dx$