Homework #9

Due: April 26, 2017 (Wednesday)

Marie Curie (1867-1934):

A scientist in her laboratory is not a mere technician: she is also a child confronting natural phenomena that impress her as though they were fairy tales.

For the hypothesis tests, perform all six steps outlined in class. This includes checking the assumptions of the test, and writing a conclusion in terms of the problem. If a significance level is not given to you in the problem, use $\alpha = .05$.

1. In class, we stated that when conducting a 1-sided test regarding the true population mean $\mu$, to maintain a Type I error rate of at most $\alpha$ and a Type II error rate of at most $\beta$ when $\mu = \mu_a$, then:
   $n = \frac{(z_\alpha + z_\beta)^2 \sigma^2}{(\mu_a - \mu_0)^2}$.

   For the hypotheses $H_0: \mu = \mu_0$ versus $H_a: \mu < \mu_0$, prove that:
   $n = \frac{(z_\alpha + z_\beta)^2 \sigma^2}{(\mu_a - \mu_0)^2}$
   is the correct sample size to maintain these error rates. **Hint:** Your book proves this result for the hypotheses $H_0: \mu = \mu_0$ versus $H_a: \mu > \mu_0$ in section 10.4 of your textbook.

2. Do exercise 10.78. For part (a), assume the data are normal. You may also have to assume normality for parts (b) and/or (c). If so, say so. For the hypothesis test in part (b), use a $t$-test.

3. Do exercise 10.80.

4. Do exercise 10.84. Perform the 6 steps of the necessary hypothesis test, ignore parts (a)-(c).

5. Do exercise 10.91. Since these answers are in the back of the book, make sure you show your work.
