HW 1 (Due Sep 07, 2017) **Name:**

Problem 1.

An experimenter has prepared a drug dosage level that she claims will induce sleep for 80% of people suffering from insomnia. After examining the dosage, we feel that her claims regarding the effectiveness of the dosage are inflated. In an attempt to disprove her claim, we administer her prescribed dosage to 20 insomniacs and we observe Y, the number for whom the drug dose induces sleep. We wish to test the hypothesis $H_0 : p = .8$ versus the alternative, $H_a : p < .8$. Assume that the rejection region $\{y \leq 12\}$ is used.

a In terms of this problem, what is a type I error?

b Find α.

c In terms of this problem, what is a type II error?

d Find β when $p = .6$.

e Find β when $p = .4$.

Problem 2. Refer to problem 1:

a Find the rejection region of the form $\{y \leq c\}$ so that $\alpha \approx .01$.

b For the rejection region in part (a), find β when $p = .6$.

c For the rejection region in part (a), find β when $p = .4$.

Problem 3.

Let Y_1 and Y_2 be independent and identically distributed with a uniform distribution over the interval $(\theta,\ \theta + 1)$. For testing $H_0 : \theta = 0$ versus $H_a : \theta > 0$, we have two competing tests:

Test 1: Reject H_0 if $Y_1 > .95$.
Test 2: Reject H_0 if $Y_1 + Y_2 > c$.

Find the value of c so that test 2 has the same value for α as test 1.