

**The homework is due Monday 3/30.**

Place your name on the back of this sheet of paper and nowhere else. Staple your answers face up on the front of this sheet of paper. Failure to follow these directions will cost you 1 point.

Your assignment will be typed, except graphs can be drawn by hand and mathematical equations can be done by hand. Failure to type it will cost you 10 points. If you use double-sided printing or print on the back of scrap paper, I will give you one additional point.

1) (25 points) Given that our courts assume that you are guilty until proven innocent, what is the null hypothesis, alternative hypothesis, Type I error and Type II error? Explain your logic for all four. There are two types of criteria for finding somebody guilty which have been used in the world. The first is “guilty beyond a reasonable doubt” (our system) and the second is “probably guilty.” Which is more likely to have a Type II error? Explain your logic.

2) (10 points) In order to reduce the probability of Type II errors,  $\beta$ , what must happen to  $\alpha$ ? Explain your logic.

3) (5 points each) For each of the following, tell me if you should use a z-test or a t-test. Explain your logic.

A) You are finding out the average temperature for a date. You know the data follows a normal distribution and you know the standard deviation of the population. You have 130 elements in the sample.

B) You are finding the average weight. The population does not fit the normal distribution. You know the population's standard deviation and you have 120 elements in the sample.

C) The population fits the normal distribution. The standard deviation of the population is not known. You have 25 elements in the sample.

D) You are comparing two samples which are independent to see if the averages are different. Their populations' standard deviations are unknown. Both samples have 28 elements.