The techniques for \_nding the distribution of a sample mean and \_nding

the distribution of a sample proportion are quite similar, although the formulas are

di\_erent. For \the rules," see Sections 8.2 and 8.3.

1. The sample must be selected randomly for any of these techniques to work.

Check that selection was random.

2. Before you do anything, check that the sampling distribution is approximately

normal. Generally this involves checking that the sample size (n) is

large enough to guarantee normality.

(a) For sample means, the sampling distribution is normal if the population

distribution is normal. If the population distribution is not normal, n

needs to be at least 30 to guarantee that the sampling distribution is

approximately normal.

(b) For sample proportions, check that both n\_ \_ 10 and n(1 􀀀 \_) \_ 10.

3. Once you know the sampling distribution is normal, you must always calculate

the standard deviation of the sample means (\_x) or sample proportions (\_p).

It will not be the same as the population standard deviation! Also, write down

the mean of the sample means (\_x) or sample proportions (\_p).

Sample Means. This example is Problem 8.20. An elevator has a maximum occupancy

of 16 people and a weight limit of 2500 lbs. The average weight of the

population is 150 lbs, with a standard deviation of 27 lbs, and the distribution of

weight in the population is approximately normal. Suppose that a random sample of

size 16 people is chosen.

Before we do anything, check that (1) the sample is selected randomly (YES) and

(2) the sampling distribution is normal. (YES) Why?

1. The expected value of the sample mean = the average value of the sample mean

= the population mean (\_) = .

2. The standard deviation of the sample means is calculated by the formula .

Its value in this problem is .

3. Since (average weight) = (sum of weights)/(sample size), the sum of the weights

is (average weight) \_ 16. So the total weight exceeds 2500 lbs if the average

weight is more than .

4. The chance that the total weight of a random sample of 16 people will exceed

2500 lbs is P(x > 156:25). The z-score for x = 156:25 is . So the

probability they will exceed the weight limit is .

5. By the way, what is the probability that any individual weighs more than

156.25 lbs?

Sample Proportions. Many categorical variables you can think of have only two

possible values (think of them as \yes" and \no," or \success" and \failure"). An

example is the outcome of a free throw. Reggie Miller of the Indiana Pacers had a 90%

free throw percentage in the 2002{2003 season. That is, on average, Miller made 9 of

every 10 free throws. Suppose we were to randomly select 100 free throws he made

throughout the season and record the number of successes in these 100 free throws.

What is the probability that he makes less than 85 of the 100 selected? (Think: is

the probability more than 50%?)

1. What is the sample? The sample size? Is selection of the sample random?

What is \_ in this problem? What does p represent in this problem?

2. Check that the probability distribution is normal. Since this is a sample proportion,

we must check that and (write the formulas).

3. Write down the average sample proportion = \_p = . Calculate the

standard deviation of the sample proportion = \_p = .

4. We're trying to \_nd the probability that p is less than . Find the

appropriate z-score: . Use the chart to \_nd P(z < ). Answer:

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5. By the way, if Miller shoots only once, what is the probability that he makes

the shot?