Prof. Bret Larget   Sample Test 2   Math 125

Problem 1: (30 points)
The prices of a sample of 25 brands of walking shoes in dollars are tabulated below.

59	109	70	76	55	50	55	69	58	59	40	46	62
52	55	65	70	60	110	78	60	65	69	58	60	

(a) Display the walking shoe data in a stemplot.

(b) Find the median, lower quartile, and upper quartile.

(c) The mean and standard deviation of the walking shoe data are $64.4 and $16.1 respectively. Find a 90% confidence interval for the population mean price of walking shoes.

(d) Are there extreme outliers or strong skewness indicated in your stemplot of the previous problem that invalidate your confidence interval? Explain.

(e) Explain how the manner in which the data was sampled may affect your interpretation of the confidence interval.

Problem 2: (30 points)
Glucose levels in blood and diabetes are related. For a certain forty year old adult, the glucose level after a 12 hour fast is approximately normally distributed with a mean on 65 and a standard deviation of 19 milligrams of glucose per deciliter. Test results less than 40 indicate a severe excess of insulin.

(a) What is the probability that a single measurement is less than 40?

(b) 5% of all single measurements will be less than what value?

(c) What is the probabilty that an average of four measurements will be less than 40?

Problem 3: (30 points)
During the recently completed NBA basketball season, MVP Shaquille O'Neal made only 52.4% of all free throw attempts. This poor percentage encouraged opposing teams to intentionally foul him late in games to force him to shoot free throws, a strategy named "Hack-a-Shaq". For the following calculations, assume that all free throws attempts are independent with the same 0.524 chance of being good.

(a) In Game 2 of the Finals, Shaquille O'Neal attempted a record 39 free throws. Calculate the probability of making exactly 18 (as he actually did).

(b) In Game 4 of the Western Confernce Finals versus Portland, Shaquille O'Neal made all 9 of his free throw attempts. What is the probability of this?

(c) If Shaquille O'Neal takes 100 free throws, what is the probability that he makes at least 60? Use the normal approximation to the binomial distribution.

Problem 4: (30 points)

The caloric content of french fries depends on how they are prepared. A random sample of eight different 3 ounce servings of french fries from different fast-food restaurants had the calories shown below.

222	255	254	230	249	222	237	287

(a) Find a 99% confidence interval for the mean number of calories in a 3 ounce serving of french fries at a fast-food restaurant.

(b) Test the null hypothesis that the mean caloric content of a three ounce serving of fries is 225 versus the alternative that it is higher.

Circle **True** or **False**. If you answer **False**, explain why. Each problem is worth two points.

Problem 5:
True or **False**:

A p-value of 0.55 indicates that the null hypothesis is just about as likely to be true as false.

Problem 6:
True or **False**:

The correlation between heights of husbands and wives is 0.5. This means that men tend to marry women who are taller than they are.

Problem 7:
True or **False**:

Patterns in residual plots can indicate nonlinear relationships.

Problem 8:
True or **False**:

In an experiment to test the effectiveness of nasal strips for race horses, 22 race horses race, once while wearing the strip and once without, with two weeks of rest in between races. Each horse is timed for the same distance during each race. This is an example of a matched pair experiment.

Problem 9:
True or **False**:

Fuel economy is negatively correlated with price of new cars. This implies that lowering prices of new cars would increase their fuel efficiency.

Problem 10:
True or **False**:

Probabilities are always between 0 and 1.

Problem 11:
True or **False**:

The sum of probabilities for all possible values of a discrete random variable is one.

Problem 12:
True or **False**:

In deriving the binomial probability formula, we considered all possible ways to draw black and white balls with replacement from a box. The number of different letter sequences of length 20 with the two letters 'B' and 'W' that contain exactly 10 'B's is 20!/10!.

Problem 13:
True or **False**:

In a one-sided hypothesis test about a population mean, the test statistic is $z = -1.48$. The p-value for a two-sided test of the same hypothesis would be twice as large as the p-value for the one-sided test.