

**MATH 21-01 (Introductory Statistics), HW 13 (100 points). Due: 12/16/2016 to a box outside my office.**

**Not from textbook (100 pts) - You may write up any 4 of the following problems.**

- (1) Suppose a following set of test scores is obtained:

$$S = [90, 94, 53, 68, 79, 84, 87, 72, 70, 69, 65, 89, 100, 75, 51, 82]$$

Find the five number summary of the following data and draw a modified boxplot. State the outliers based on the IQR classification. Find the mean and standard deviation. Are there any outliers based on the z-score classification?

- (2) A box contains 8 red, 3 white and 9 blue balls. If 3 balls are drawn at random without replacement, determine the probability that (a) all three are red, (b) all 3 are white, (c) 2 are red and 1 is white, (d) at least 1 is white, (e) 1 of each color is drawn.
- (3) Suppose two cards are drawn from a standard deck of 52 cards. Find the probability that both cards are aces if (a) the first card is put back in the deck and deck reshuffled after being drawn, (b) the first card is not put back in the deck after being drawn.
- (4) A manufacturer claims that its medicine is 90% effective in relieving allergy symptoms. In a sample of 200 people with an allergy, the medicine was effective for 160 people. Set up a hypothesis test and determine if the manufacturers claim is legitimate by using 0.01 as the level of significance.
- (5) Suppose we like to compare the mean widths of two types of industrial ethernet cable lines in cm. The two manufacturers claim their cables are of exactly the same width (4.2 cm in diameter). On the other hand, a facilities manager does not believe this to be the case. The following are two samples of cable widths:

$$A : [4.21, 4.13, 4.24, 4.32, 4.18, 4.10, 4.18, 4.28, 4.23, 4.27]$$

and

$$B : [4.27, 4.38, 4.25, 4.31, 4.40, 4.36, 4.33, 4.35, 4.17, 4.41]$$

Below, use the provided sample data and the t-distribution (see class notes for the form of the statistic to use). (a) Find a 95% confidence interval for the difference between the two population means (of cable widths). (b) At the  $\alpha = 0.05$  confidence level, test the claim that the cable width means are not equal to one another and report your findings.

- (6) Suppose that you have obtained a sample of weights of certain kinds of large fish in the Atlantic, in pounds. You have caught and released 50 fish of one kind, from which you got a sample mean of  $\bar{x} = 25$  pounds and a sample standard deviation of  $s = 4$  pounds. If you use the sample standard deviation as an approximation to the population standard deviation for these kinds of fish, find the probability that if you use  $\bar{x}$  as an estimate of the population mean weight  $\mu$ , your estimate will be within 3 pounds of the population mean.