

ISyE 6739 – Group Activity 5

Names:

Group Number:

Problem 1. Calculate the following probabilities.

a) If $X_1, X_2 \sim NID(\mu = 0, \sigma^2)$, what is $\Pr(\bar{X} < S)$? What is $\Pr(\bar{X} < \sigma)$?

b) If $X_1, X_2, X_3 \sim NID(\mu = 1, \sigma^2 = 1)$, what is $\Pr(X_1 + X_2 > X_3)$?

c) If $X_1, X_2 \sim NID(0, \sigma^2)$, $Y_1, Y_2 \sim NID(0, 2\sigma^2)$, and X 's and Y 's are independent, what is

1.
$$\Pr\left\{2\sum_{i=1}^2 (X_i - \bar{X})^2 + \sum_{i=1}^2 (Y_i - \bar{Y})^2 > \sigma^2\right\}$$

2.
$$\Pr(2\sum_{i=1}^2 (X_i - 0)^2 + \sum_{i=1}^2 (Y_i - 0)^2 > \sigma^2) ?$$
 You may use R.

3.
$$\Pr(2\sum_{i=1}^2 (X_i - \bar{X})^2 > \sum_{i=1}^2 (Y_i - \bar{Y})^2) ?$$

4.
$$\Pr(2\sum_{i=1}^2 X_i^2 > \sum_{i=1}^2 Y_i^2) ?$$

Problem 2. The company JCrew advertises that 95% of its online orders ship within two working days. You select a random sample of 200 orders received over the past month to audit.

a. What is the mean and standard error (SE) of the proportion of delayed packages in the sample?

b. What is probability that the proportion in a random sample of 200 orders is as small or smaller 0.1?

c. If we treated the problem as a binomial, what would be the probability in part b.