ISyE 6739 – Group Activity 11

Problem 1. Three different pesticides can be used to control the infestation of grapes. It is suspected that pesticide 3is more effective than other two. In a particular vineyard, three different planting of pinot noir are selected for study and the following results on yield are obtained:

Pesticide	$\bar{x}_i$ (bushels/ plant)	s_i	n_i (number of plants)
1	4.6	0.7	100
2	5.2	0.6	120
3	6.1	0.8	130

Assuming that the observations are following normal distributions and the variances are equal, find a two-sided 95% confidence interval for $\mu = \frac{1}{2}(\mu_1 + \mu_2) - \mu_3$.

Problem 2. A sales manager in Procter And Gamble believes that the demand for Tide in Decembers is more than 10K units and wants to convince the production manager to increase the production rate in December. The Production manager asks the analytics department to test this claim with 95% confidence. The analytics department collects a random sample of sales in 9 past Decembers since 2000 and computes the average as 10.5k. Based on the past experience the standard deviation of the demand for Tide is 1k.

a. State the appropriate null and alternative hypotheses.

b. Evaluate the hypothesis test using CI.

c. Evaluate the hypothesis test using a test statistic.

d. Evaluate the hypothesis test using P-value.

e. What is the significance level?

Problem 3. The results below show the performance of the Georgia Tech's basketball team in season 2016-17. Assume this represents a random sample of their performance and the population standard deviation is 16. Based on the given sample and with the confidence 95%, we like to investigate whether the mean score difference is zero.

a. State the appropriate null and alternative hypotheses.

b. Evaluate the hypothesis test using CI.

c. Evaluate the hypothesis test using a test statistic.

d. Evaluate the hypothesis test using P-value.

e. What is the significance level?

Opponent	Results	Score Diff	Attend
TENNESSEE TECH	W	15	6018

SOUTHERN	W	15	4360
OHIO	L	-6	4802
SAM HOUSTON STATE	W	8	4181
TULANE	W	14	4479
at Penn State	L	-7	6032
at Tennessee	L	-23	12634
at VCU	Wot	3	7637
ALCORN STATE	W	24	4599
GEORGIA	L	-17	8600
WOFFORD	W	4	4725
NORTH CAROLINA A&T	W	7	5024
NORTH CAROLINA	W	12	7754
at Duke	L	-53	9314
LOUISVILLE	L	-15	6160
CLEMSON	W	12	5602
at NC State	W	10	17781
at Virginia Tech	L	-1	6598
at Virginia	L	-13	14459
FLORIDA STATE	W	22	6542
NOTRE DAME	W	2	8600
at Clemson	L	-12	7530
at Wake Forest	L	-12	10962
TUSCULUM	W	38	2437
BOSTON COLLEGE	W	11	7391
at Miami	L	-9	7111
SYRACUSE	W	6	8600
NC STATE	L	-2	6950