PROBLEM 1 Q1

Null Hypothesis: Students become knowledgeable in the material ($\mu = 0.75$)
Alternative Hypothesis: Students does not become knowledgeable in the material ($\mu \neq 0.75$)
Type of test can be used: z-test

PROBLEM 1 Q2

Sample size = 937
Sample mean = 0.743030411045
Standard error = 0.00415302728827
Standard cost = -1.6781948375
P value = 0.0933090692524

Is result at significance level 0.1? Yes
Is result at significance level 0.05? No

Based on the results gathered, we can conclude the hypothesis is:
significant at a = 0.1 (reject Ho),
not significant at a = 0.05 (cannot reject Ho)

PROBLEM 1 Q3

Largest standard error which the test will be significant at 0.05 is 0.00355597807416
minimum sample size is 1278.05931911 (1278)

PROBLEM 1 Q4

Null Hypothesis: mean engagement of students who become knowledgeable in the material is the same with those who do not
Alternative Hypothesis: mean engagement of students who become knowledgeable in the material is NOT the same with those who do not
Type of test can be used: two-sample-z-test

PROBLEM 1 Q5

This is the result for sample from eng1.txt:
Sample size = 1977
Sample mean = 0.639954507704
Standard error = 0.00571598958877
Standard cost = -19.2522205626
P value = 1.35240102861e-82

This is for sample from eng0.txt
Sample size: 937
Sample mean: 0.743030411045
Standard error: 0.00415302728827
Standard cost: -1.6781948375
P value: 0.0933090692524

Z-score: 14.58878454
P value for two-z-sample-test: 3.31043071683e-48

Based on the results gathered, we can conclude the hypothesis is significant at a = 0.1,0.01,0.05 (reject Ho), which means that the mean for samples in eng1.txt is different from the mean for samples in eng0.txt.

PROBLEM 2 Q1

I am using t-test because we don't know standard deviation and n < 30

Mean = 7.36363636364
Standard error = 5.07627767575
Standard statistic/t-value = 2.22813885196
Confidence interval for 95% is (3.9533466179911163, 10.773926109281611)

PROBLEM 2 Q2

I am using t-test because we don't know standard deviation and n < 30

Standard statistic/t-value: 1.81246112281
Confidence interval for 90% is (4.5895643725433333, 10.137708354729394)

The t-value is lower for 90% confidence interval and the confidence interval is also smaller.

PROBLEM 2 Q3

I am using z-test since we know the population standard deviation.

Mean: 7.36363636364
Standard error: 5.07624499731
Standard statistic/z-value: 1.95996398454
Confidence interval for 95% is (4.3638223960257854, 10.363450331246941)

The standard statistic and confidence interval are all different from the results in Problem 2 Q1 and Problem2 Q2.

PROBLEM 2 Q4

I can say with 82.24% confidence that the team is expected to win on average. This is based on the results calculated in the code:

T-value: 1.4505976296
p-value: 0.177524787237
Confidence value: 0.822475212763
Confidence interval: (5.143416462654649, 9.5838562646180776)