Stat 2470, Quiz #12, Spring 2015 Name KEY

Instructions: Show all work. State any formulas used. If you use the calculator, you should say which function you used, and what you entered into it, as well as any output. I can only give partial correct for incorrect answers if I have something to grade.

1. Data shown in the table below represent individual student test scores before remediation and after remediation. Determine if remediation helped students improve their test scores by more than 5 points. Conduct an appropriate hypothesis test at the 10% significance level.

SUBJECT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
BEFORE	23	13	15	36	22	23	26	27	26	14	21	24	15	7	15	27
AFTER	27	24	24	28	30	29	17	30	25	28	22	14	16	23	22	38

before $-L_1$
after $-L_2$
$L_2 - L_1 \to L_3$
Paired T-Test
T-Test Data

$H_0: \mu_2 - \mu_1 = 5$
$H_a: \mu_2 - \mu_1 > 5$
$\mu_0 = 5$
List: L_3
$\mu > \mu_0$

$\Rightarrow t = .534$
$p = .6995 > .10$

not enough evidence to think remediation improves score by 5 points or more

2. Conduct an appropriate hypothesis test comparing two types of spam email, one plain and one with graphics, sent by the same spammer to determine if adding graphics to his spam email improve response rate significantly. Clearly state the appropriate hypotheses. Use a 1% significance level to determine if the extra effort is worth it.

Type	Number Sent	Response Rate
No graphics	6,000,000	0.001%
With graphics	4,000,000	0.002%

2 PropZTest
$X_1 = 60 = .00001 * 6{,}000{,}000$
$n_1 = 6{,}000{,}000$
$X_2 = 80 = .00002 * 4{,}000{,}000$
$n_2 = 4{,}000{,}000$

$p_1 < p_2$

$H_0: p_1 = p_2$
$H_a: p_1 < p_2$ or $p_2 > p_1$

$\Rightarrow z = -4.14$
$p = 1.73 \times 10^{-5} < .01$

Reject H_0
There is evidence to think spam w/ graphics gets more returns than spam w/o it.

3. Four types of placement tests can be used to place students in math classes at a particular college. After the scores are adjusted for comparison, the following table gives data for the percentiles for scores on each test. Conduct an appropriate hypothesis test to determine if there is good reason to think that one of the tests places students differently than the others. Clearly state the hypotheses and the conclusion in the context of the problem.

Test								
A	33	49	92	40	17	43	99	23
B	49	7	98	31	50	40	23	10
C	97	22	15	95	39	38	62	22
D	56	26	74	35	73	40	54	13

all data into L_1, L_2, L_3, L_4 for each test

ANOVA(L_1, L_2, L_3, L_4)

$H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4$

H_a: at least one μ_i is $\neq$ to μ_j for $i \neq j$.

$F = .2462$

$p = .8633 \leftarrow > .05$

Factor

$df = 3$

$SS = 608.09$

$MS = 202.6979$

Error

$df = 28$

$SS = 23051.375$

$MS = 823.26$

$S_{xp} = 28.69$

fail to reject H_0

it does seem like all tests place students roughly the same