

Name: _____

Fall, 2013

Applied Statistics Comprehensive Examination

Statistical Methods I & II

You must give complete explanations to receive full credit.

1. (20 points) An insurance company recently ran a study to compare the sales rates for three different telephone sales strategies. Each strategy was used on 1000 randomly selected customers who called the company, and the results are given in the table below. Using a level-0.05 test, determine whether there is a difference in the sales rates for the three strategies.

Strategy	Customers	Sales
A	1000	180
B	1000	220
C	1000	155

2. (25 points) An airline is seeking permission to land jets at the small airport located just a mile or so from your mansion. The airline claims that the jets are comparable in terms of noise level to the propeller planes that currently land at the airport. Summary statistics on noise levels (in decibels) for 11 recent landings for each type of plane are given in the table below.

Type	Sample size	Sample mean	Sample standard deviation
Jet	11	105	17
Propeller	11	102	12

- (a) (15 points) Using a level-0.10 test, test for a difference in the mean noise level for the two types of plane.

- (b) (10 points) Find a 90% confidence interval for the standard deviation of the noise level for jets.

3. (30 points) Your boss believes that pennies that are spun (rather than flipped) land heads up exactly 50% of the time. You suspect that the true proportion of heads is less than 50%. To investigate this, you spin a penny 100 times, obtaining 42 heads.

(a) (15 points) Using a level-0.05 test, test for evidence that your suspicions are correct.

(b) (15 points) Suppose that the true proportion of heads is actually 35%. What is the power for the test that you did in part (a)?

4. (25 points) A chemist wants to compare four treatments using experimental material coming from the four manufacturers which routinely supply his company. There is sufficient experimental material from each manufacturer for 12 experimental units. Thus, three experimental units from each manufacturer are randomly assigned to each treatment.

(a) (7 points) State the appropriate mathematical model and all of its assumptions for this experimental situation.

(b) (4 points) State the sources of variation and their associated degrees of freedom for the ANOVA of the experimental data.

(c) (7 points) Briefly describe how inferences about the main effects of treatments in the resulting ANOVA may be affected by the significance or lack of significance of the interaction term in the ANOVA.

(d) (7 points) Briefly describe how you would investigate differences among the treatments if the main effect of treatment in the resulting ANOVA is significant.