MIDTERM EXAM (ver 2)

STA 110A
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Name: ______________________________

1. This is an open book and open notes exam.

2. Your group must show work and explain the answer in order to receive credit.

3. The exam carries 100 points.

4. The points assigned to each problem are indicated at the end of that problem. Use them to plan your time. You have 75 minutes to finish.

5. The exam has 6 problems. Make sure your copy has all of them.

Problem	Guessing	Golfer	Anxiety	Jigsaw	IQ	Close	Total
Score	/15	/15	/15	/20	/15	/20	/100

Guessing. **[15]** Subject in an experiment are told that either a red or a green light will flash. Each subject is to guess which light will flash. The subject is told that the probability of a red light is 0.7, independent of guesses. Assume that the subject is a probability matcher-that is , guesses red with probability .70 and green with probability .30.

(a) What is the probability that the subject guesses correctly?

(b) Given that a subject guesses correctly, what is the probability that the light flashed red?

Golfer. **[15]** If it is assumed that a golfer will hit a drive into a sand trap 18% of the time, what is the probability that the player will hit the ball into a sand trap

(a) exactly three times out of first six holes;

(b) between 180 and 185 times (inclusive) out of first 1000 holes.

Anxiety Measure. **[15]** Morelli et al. (1982) report on a study in which extrovert and introvert groups were measured on anxiety scale[1].

Assume that the data were as follows:

Extroverts:	5.5	7.0	8.8	5.3	6.9	8.4	9.1	7.0	5.8	6.0	7.3	9.8
	5.2	6.7	8.2	7.9	6.1	7.4	6.6	4.7	7.4	7.6	6.4	6.6
Introverts:	7.1	7.6	9.0	8.0	5.4	8.7	9.3	8.2	8.5	6.7	8.9	9.6
	8.2	9.2	9.7	8.7	9.5							

(a) Find the 5-number-summary for both data sets. *You may find this info useful:*
Extroverts (ordered): 4.7 5.2 5.3 5.5 5.8 6.0 6.1 6.4 6.6 6.6 6.7 6.9 7.0 7.3 7.4 7.4 7.6 7.8 7.9 8.2 8.4 8.8 9.1 9.8
Introverts (ordered): 5.4 6.7 7.1 7.6 8.0 8.2 8.2 8.5 8.7 8.7 8.9 9.0 9.2 9.3 9.5 9.6 9.7

(b) Draw a stem-and-leaf display of each groups anxiety score.

(c) If you want to give an interval estimator of the population mean μ for Extroverts anxiety score, what sample size do you need to achieve 99% confidence with an interval of total length 0.1. Assume that the scores come from a normal population with known standard deviation $\sigma = 1$.

[1] Morelli, G., Andrews, L., and Morelli, R. (1982). The relation involving personality variables, problem relevance, rationality, and anxiousness among college men, *Cognitive Therapy and Research, 6, 57-62.*

Jigsaw. **[20]** An experiment with a sample of 18 nursery-school children involved the elapsed time required to put together a small jigsaw puzzle. The times were:

3.1	3.2	3.4	3.6	3.7	4.2	4.3	4.5	4.7
5.2	5.6	6.0	6.1	6.6	7.3	8.2	10.8	13.6

(The sample mean is 5.783, and the sample standard deviation is 2.784).

(a) Calculate a 95% confidence interval for the population mean.

(b) Test the hypothesis $H_0 : \mu = 5$ against the two sided alternative. Take $\alpha = 10\%$.

IQ test pairing. **[15]** In a study, children were first given an IQ test. The two lowest-scoring children were randomly assigned, one to a "noun-first" task, the other to a "noun-last" task. The two next-lowest IQ children were similarly assigned, one to "noun-first" task, the other to a "noun-last" task, and so on until all children were assigned. The data (scores on a word-recall task) are shown here, listed in order from lowest to highest IQ score

Noun-first	12	21	12	16	20	39	26	29	30	35	38	34
Noun-last	10	12	23	14	16	8	16	22	32	13	32	35

1. Are these two samples (Noun-first, Noun-last) independent?

2. Test the hypothesis that the population mean difference is 0 assuming the two sided alternative. Take $\alpha = 10\%$. *The following info may be useful: the difference sample mean is 6.583 and the difference sample standard deviation is 11.041.*

Close Encounters. **[20]** Otis[2] (1979) interviewed moviegoers waiting to see the *space aliens* film "Close Encounters of the Third Kind." Each moviegoer was asked to state his or her degree of agreement with the statement "Life on Earth is being observed by intelligent aliens," on a scale from 1 (strongly disagree) to 5 (strongly agree). Assume that the population standard deviation is known: $\sigma = 1$.

1. Why $H_0 : \mu = 3$ is a natural null hypothesis?

2. The purpose of the study was to test Otis' assertion that individuals selected movies that they were predisposed to believe. Formulate Otis' assertion as an H_1 hypothesis.

3. The test adopted can be described as follows:
If the sample mean of $n = 25$ moviegoers is larger than 3.4, reject H_0.
(a) Find α for the test.

(b) Find β against $H_1 : \mu = 4$.

(c) If the observed $\bar{X}$ for $n = 25$ was in fact 3.5, what is p-value?

[2] Otis, L. (1979). Selective exposure to the film "Close Encounters". *Journal of Psychology, 101, 293-295.*