

MATH 217
Exam II
Maymester 2008

To receive full credit you *must* **show all work** and **circle all answers**.

1. (12 points) The following table gives opinions (agree, disagree, neutral) vs. age range on an issue.

	Agree	Disagree	No opinion
18-24	40	15	7
25-30	20	29	22
31-35	10	22	28

- (a) Give all marginal distributions.
- (b) What percent of people that agree are 18-24?
- (c) What percent of people age 18-24 agree?
- (d) How many people were surveyed?
2. (10 points) The standard deviation of a population is 13.5. How large of a sample would we need to use to ensure that the sample distribution's standard deviation is 5?
3. (10 points) I roll a 6-sided die and then flip a coin.
- (a) What is the sample space for this phenomenon?
- (b) What is the probability that you roll an EVEN number and flip a HEAD?
4. (10 points) You have 400 subjects in your experiment. You want to randomly select 5 of these using a random number table. The random number table reads

01928 38492 51211 09572 48201 82944.

- (a) Carefully explain how you would number the subjects to use this table.
- (b) What are the numbers of the 5 subjects selected?

5. (12 points) You are running an experiment where you randomly choose a class from campus. From that class, you randomly select 25 people (assume the class has over 40 people) and ask them whether they drank coffee during their last exam and what their grade was. You discover that the average grade for the coffee drinkers was 78 while the average grade for the non-coffee drinkers was 72.
- (a) What do you believe is the intended population of this study? Justify your response.
 - (b) Is this an observation or an experiment? Justify your response.
 - (c) Can we conclude that drinking coffee raises your grade? What are some possible confounding variables or design problems?
6. (12 points) A state official wants to know which party the voters in his state feel is best qualified to lead the country over the next 10 years. He mails a questionnaire on this subject to a SRS of 1600 voters in his state. His staff reports that 325 questionnaires have been returned, of these 241 respondents feel the Democratic party is best qualified to lead the country over the next 10 years.
- (a) What do you believe is the intended population of this study? Justify your response.
 - (b) What is the sample?
 - (c) What is the non-response percent?
7. (8 points) You weigh 150 dogs of the same breed and age and get a mean weight of 70lbs. Your vet has told you that she does not recall the mean age of this breed of dog, but the standard deviation is 5 pounds. Construct a 90% confidence interval for the mean.
8. (10 points) In a large population of college-educated adults, the mean IQ is 118 with a standard deviation of 20. Suppose 200 adults from this population are randomly selected for a research campaign.
- (a) What is the mean and standard deviation of the sample mean IQ?
 - (b) What is the probability that the sample mean is greater than 120?

9. **(Multiple Choice)** (4 points) A television program asks viewers whether the United Nations should continue to have its headquarters in the United States. Two phone numbers were given. Viewers were asked to call one telephone number to respond “yes” and another to respond “no”. More than 186,000 callers responded and 67% said “no”. This is an example of:
- (a) a voluntary response sampling.
 - (b) a survey with little bias because a large SRS was used.
 - (c) a survey with little bias since someone who called would know his or her opinion.
 - (d) all of the above.
10. **(Multiple Choice)** (4 points) A news release for a diet products company reports: “There’s good news for the 65 million Americans currently on a diet.” Its own study showed that people who lose weight can keep it off. The sample was 20 graduates of the company’s program who endorsed the program in commercials. The results of the sample are probably:
- (a) biased, overstating the effectiveness of the diet.
 - (b) biased, understating the effectiveness of the diet.
 - (c) unbiased since the people in the sample are nationally recognized individuals.
 - (d) unbiased but they could be more accurate. A larger sample size should be used.
11. (8 points) In a study of human development, investigators showed two movie that were different types to groups of children. Crackers were available in a bowl, and the investigators compared the number of crackers eaten by children watching both movies. One movie was shown at 8am (right after the children had breakfast) and the other was shown at 11am (right before the children had lunch). It was found that during the movie shown at 11am, more crackers were eaten than during the movie shown at 8am. The investigators concluded that the different types of movies had different effects on appetite. Is this an appropriate conclusion? Carefully explain why or why not.

BONUS

Each bonus problem is worth 6 pts. All work must be shown with a clearly marked answer.

1. Explain the Central Limit Theorem in your own words and give an example of its use.
2. How loud do people like their music? For some reason (mostly because it is on this exam) you become interested in certain music fans and the volume at which they listen to their music. You obtain information from two music fans: fans of Ani DiFranco and fans of GWAR. You studied 100 Ani fans and 49 GWAR fans. Your sample of Ani fans had a mean preferred volume of 80 decibels and the GWAR fans had a mean preferred volume of 115 decibels. Assume that the true population standard deviation of both Ani and GWAR fans is 5 decibels. Construct 95% confidence intervals for the mean decibel level for Ani and GWAR fans. Using your two confidence intervals, briefly try to convince me that Ani and GWAR fans actually have different preferred volumes.