MATH 210 - Test #2 - 3/20/03

Points in [brackets] sum up to 100. Show all work for full credit!

1. A fast-food restaurant observes the following distribution for the price of meals ordered by customers. (Prices have been rounded to the nearest dollar.) For example, 20% of all meals sold cost two dollars.

Price (X)	1	2	3	4	5	6
Probability (P)	.05	.20	.30	.20	.15	??

a. For this to be valid probability distribution what proportion of meals cost $6?
[4]

b. Determine the probability that a randomly chosen person's meal will cost less than $3.50.
[4]

c. Compute the *expected* (i.e., mean) cost of a meal at this restaurant.
[5]

d. Compute the *standard deviation* in the cost of a meal.
[5]

e. Suppose a family of three enters the restaurant. Assuming their meal choices are independent, what is the probability they *all* order five-dollar meals?
[5]

f. In question (e), explain why it is probably *not* reasonable to assume that the three people's choices are independent.
[3]

2. Based on historical data, a publishing company knows that about 40% of all applicants for proofreading jobs are actually qualified. The company receives twenty applications and will interview all applicants. The company is hoping to hire ten qualified people.

[8]

a. Show how this situation can be modeled as a binomial experiment by defining the following components. These must be defined *verbally* in the context of this problem. **Additionally, state *specific values* corresponding to *n* and *p*.**

n is **n =**

SUCCESS is

X is

p is **p =**

b. What is the mean number out of 20 applicants who will be qualified?

[4]

c. What is the standard deviation in the number of qualified applicants?

[4]

d. What is the probability the company will be able to fill all 10 positions? (I.e., *at least* 10 of the applicants are qualified.)

[10]

3. The following two-way table gives a breakdown of 1000 M.C. students by sex and class.

[16]

	FY	SO	JR	SR	Total
MALE	156	125	130	109	520
FEMALE	144	135	120	81	480
Total	300	260	250	190	1000

You plan to choose a student "at random" (i.e., a fair draw).

a. What is the probability the student chosen is a *junior*?

b. What is the probability the student chosen is *male*?

c. What is the probability the student chosen is a *male junior*?

d. Are the events MALE and JUNIOR *independent*? **Use specific calculations to justify your answer!**

4. Suppose that in a certain elementary school, students' weights are *uniformly distributed* from 40 to 100 pounds. What percent of students weigh between 50 and 80 pounds?

[6]

5. In a binomial experiment, the sample count X is approximately normal when: (circle *one*)

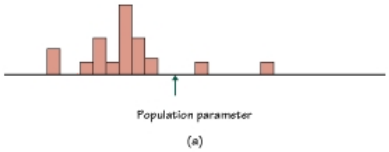
[3]

- The observations are random.
- The sample is unbiased.
- The sample is sufficiently large.
- The observations are independent.

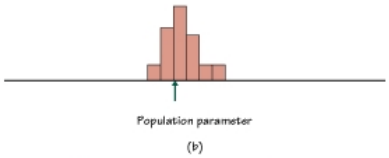
6. Consider the histograms below, each representing a sampling distribution for $\bar{x}$. The true population parameter μ is marked in the center of each. Match the letter of each histogram to the appropriate description on the right.

[8]

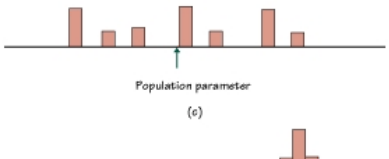
a.



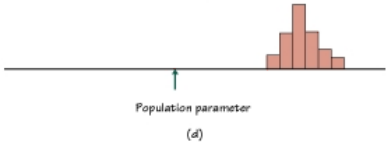
b.



c.



d.



_____ biased, with low variation

_____ unbiased, with high variation

_____ biased, with high variation

_____ unbiased, with low variation

7. Match the terms below with their definitions.

[12]

a. a value describing an entire population
b. when one outcome has no effect on another outcome
c. a variable that takes on a countable or finite number of values
d. events having no outcomes in common
e. the opposite of the original event
f. data values are "evenly" spread out from the low to the high
g. a value computed from a sample
h. a variable that takes on values over a range of the real number line

_____ disjoint

_____ parameter

_____ complementary

_____ statistic

_____ discrete

_____ continuous

_____ independent

_____ uniform

8. According to the "Law of Large Numbers": (circle *one*)

[3]

a. If you toss a fair coin and obtain 10 straight heads, then on the next 10 tosses you are more likely to get tails so that things start to even out.
b. The more data you collect the less biased it will be.
c. In Question #1, the more customers you observe, the closer the average meal cost will be to the expected cost.
d. Large numbers can be more easily estimated than small numbers.