**STA 291**                **Exam 1**              Name: ___*Key*___

**Spring 2000**                            ID #:_____

You must show all mathematical work to receive full credit for the problems. You must write in complete, grammatically correct sentences on all commentary and explanation questions.

**Problem 1 (20%):** You decide to do a survey on the price of a 10 inch cheese pizza in Lexington area. There are only 5 stores that offer delivery to your dorm. The following are the prices (in dollars) of the pizza from different stores.

$$10.49, 12.99, 9.99, 9.39, 10.99$$

$$9.39, \; 9.99, \; 10.49, \; 10.99, \; 12.99$$

a) Calculate the median and range for this data

median = ___10.49___  [4]

range = ___12.99 − 9.39 = 3.60___  [4]

b) Calculate the mean, standard deviation, variance for this data.

$\overline{x}$, mean = ___10.77___  [4]

$s$, standard deviation = ___1.3755___  [4]

$s^2$, variance = ___(standard deviation)$^2$ = 1.892___  [4]

**Problem 2 (33%):** A poll was conducted on 2000 randomly selected republicans in the State of South Carolina. The question was: *If you are to chose the Republican candidate today, who are you going to vote for?* . Results are tabulated as follows.

|        | Female | Male |
|--------|--------|------|
| Bush   | 28%    | 23%  |
| McCain | 29%    | ?    |

Define the events:

FEMALE = 'person polled is a Female'

MALE = 'person polled is a Male'

Bush = 'person polled will vote for Bush'

McCain = 'person polled will vote for McCain '

a) Find the missing entry of the table. $100\% - 28\% - 29\% - 23\% = 20\%$    $\boxed{4}$

Based on the table,

b) Calculate P(FEMALE). $28\% + 29\% = 57\%$    $\boxed{4}$

c) Calculate P(Bush, given FEMALE). $\dfrac{28\%}{28\% + 29\%} = 0.4912$    $\boxed{5}$

d) Calculate P(FEMALE, given Bush). $\dfrac{28\%}{28\% + 23\%} = 0.5490$    $\boxed{5}$

e) Are events 'FEMALE' and 'Bush' independent? Explain with numbers.    $\boxed{5}$

f) Calculate P(Bush and Male). $23\%$    $\boxed{5}$

g) Calculate P(McCain or FEMALE). $28\% + 29\% + 20\% = 77\%$    $\boxed{5}$

**Problem 3 (23%)** : In football game, the kick after touchdown is rarely missed. According to statistics, John has a success rate of 90% in those kicks. Suppose repeated kick after touchdown by kicker John can be viewed as a binomial model.

a) Write down the probability distribution table for the number of success in 5 kicks.

| # of succ | 0 | 1 | 2 | 3 | 4 | 5 |
|-----------|---|---|---|---|---|---|
| prob      |   | 0.00045 |   | 0.0729 | 0.32805 |   |

$0.00001$        $0.00810$

What is the probability that        $0.59049$

b) John misses one out of 5?

miss one = score 4   = 0.32805        $\boxed{5}$

c) John misses one or more out of 5?

= score 4 or less =

= $1 - P(\text{scores } 5) = 1 - 0.59049 = 0.40951$        $\boxed{6}$
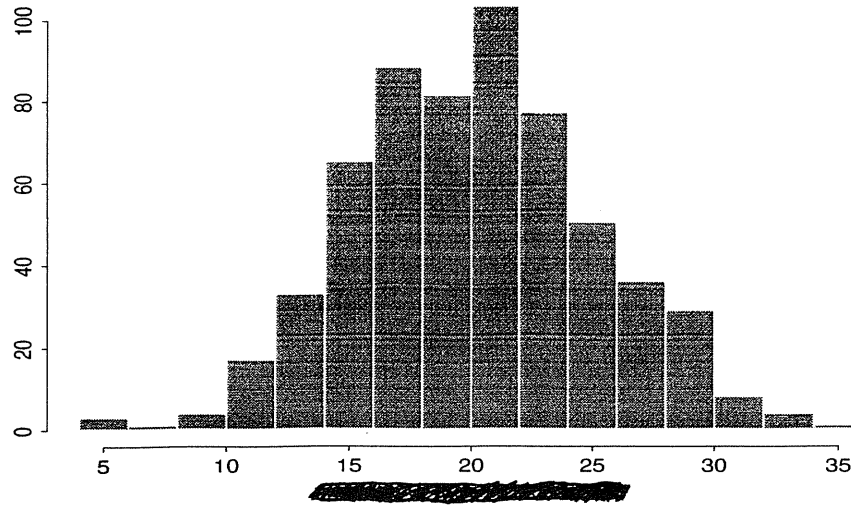
d) He scores 5 out of 5?

$1 \times 0.9^5 \, 0.1^0 = 0.9^5 = 0.59049$        $\boxed{5}$

**Problem 4 (5%)**  A population is, by definition

1. a collection of random digits;

2. part of a sample;

3. the result of some experiment;

(4.) none of the above.

**Problem 5 (7%)** A histogram plot based on 600 numbers is given. From the plot we can tell that, approximately

1. the median of the data is 30;

2. the maximum of the data is 21;

3. the mean is 55;

4. the standard deviation, $s$, is 5.

**Problem 6 (5%)** Which of the following is most likely NOT a binomial random variable?

1. money a student spent in Spring Break week;

2. number of heads you get in 12 flip of the same coin;

3. number of coupons get redeemed among the 200 that distributed;

4. number of students that have cell-phone in a class of 50.

**Problem 7 (7%):** A scientific study of a type of cancer on mice yield the following table

|  | Male | Female |
|---|---|---|
| have cancer | 0.2 | 2/5 |
| no cancer | 0.4 | 4/5 |

[4] $0.4/3 = \frac{4}{30} = \frac{2}{15} = 0.1333$

[3] $\frac{6}{15} = \frac{4}{10} = 0.2666$

Two entries are missing. If the event (male) and event (have cancer) are independent, how should you fill the entries?

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