MidTerm Stat 160 Fall Term 2004 October 19, 2004 NAME:
FORM A

For the next two questions: In the recent Olympics, the finishing time (in seconds) were recorded for all swimmers on a 400-m lap. The following statistics were computed:

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Q1=55 Median= 60 Q3=63 Max=67.
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1. Which of the following statements is true?

   (a) The fastest 25% of the swimmers completed the lap in less than 55 seconds.

   X(b) All statements are true.

   (c) Half of the swimmers completed the lap in exactly 1 minute.

   (d) The slowest 25% of the swimmers completed the lap in more than 63 seconds.

2. Suppose the RANGE was computed to be equal to 14. What is the fastest time recorded?

   (a) 67 seconds

   (b) 49 seconds

   X(c) 53 seconds

   (d) need more information

3. Suppose I have a coin which I claim has probability of heads being 3/4. How should you test this claim?

   Xa) Use resampling. Toss the coin a large number of times, N. Let $\hat{p}$ be the proportion of heads and and estimate the error, *error*, of estimation. See if $\hat{p} \pm error$ includes 3/4.

   b) Use resampling. Toss the coin a large number of times, N. See if $\hat{p} = 3/4$.

   c) Argue that there are two sides to the coin and that each side is equally likely, so the probabliity of heads must be 1/2, not 3/4.

   d) Tell me I am an idiot.

   For the next three questions, refer to the following 5 number summary of the amount of rainfall (in inches) across US in August 2003

   ```
   Min = 1.4  Q1= 2.0  Median=2.4  Q3=2.7  Max = 3.8
   ```

4. What type of data is the amount of rainfall cited above?

   (a) cannot be determined

   (b) discrete

   (c) symmetric

   X(d) continuous

5. Which of the following observations can be considered outliers?

   (a) Michigan: 3.7

   X(b) Texas : 3.8

(c) California: 1.4

(d) all of the above

6. Compute: RANGE - INTERQUARTILE RANGE

(a) 2.0

(b) 2.4

X(c) 1.7

(d) 0

7. Recall the bus stop problem: The Metro Transit Brown bus is scheduled to arrive at the Schneider Hall bus stop at exactly 8:24 a.m. But the bus actually arrives according to the following table:

8:22	10%
8:23	30%
8 :24	50%
8:25	10%

You arrive at the bus stop to catch the bus according to the following table:

8:2 2	20%
8:23	40%
8:24	30%
8:25	10%

Based on 20 trails, what is the correct resampling model that estimates the probability of catching the bus. (Assume that you catch the bus if you arrive at the bus stop at the time or before the bus does.)

Xa) Number of Trials = 20
Minimum Value = 0
Maximum Value = 9
Number to sample = 2
With Replacement

b) Number of Trials = 20
Minimum Value = 1
Maximum Value = 4
Number to sample = 2
Without Replacement

c) Number of Trials = 20
Minimum Value = 1
Maximum Value = 4
Number to sample = 2
With Replacement

d) Number of Trials = 20
Minimum Value = 0
Maximum Value = 9
Number to sample = 2
Without Replacement

8. The grade point averages (gpa's) X of students are uniformly distributed between 2.0 and 3.5. What is the probability that X is between 2.8 and 3.2?.

   (a). 1

   (b). 1.5

   X(c). 0.267

   (d). 0.4

   For the next two questions, refer to the following situation: An attempt to explore the relationship between the score (SCORE) of a student in an exam (in %) and the number of hours (HOURS) spent studying was done using linear regression. A summary of the results are as follows:

```
SCORE = -1.3 + 20.5*HOURS
R square = 74.9%
```

9. The estimated regression line implies that:

   (a) If the student didn't study for the exam, then his Score will be 74.9%

   (b) For every hour increase spent in studying, the score decreases by 1.3%

   X(c) For every hour increase spent in studying, the score increases by 20.5%

   (d) For every hour increase spent in studying, the score decreases by 20.5%

10. Compute the residual for the student who studied for 4 hours and got a score of 90%

    X(a) 9.3

    (b) -9.3

    (c) 6.7

    (d) -6.7

    For the next two questions: Consider the following weights (in lbs.) of mice exposed in an ozone-free environment: 0.2, 0.4, 0.35, 0.15, 0.5, 0.71

11. In the encoding of the data, 0.71 was typed as 7.1. Which of the following statistics would be greatly affected by this mistake?

    (a) Interquartile Range

    X(b) Standard Deviation

    (c) Median

    (d) Hodges-Lehmann Estimate

12. Which of the following statistics will have "squared lbs" as its units?

    (a) Range

    X(b) Variance

    (c) Mean

    (d) Third Quartile

13. Suppose in a cooler I have a six-pack of Bell's Oberon, a six-pack of Bell's Amber, and a six -pack of Miller Light. Further, suppose that the beers are well mixed and indiscernable. Without looking I reach into the cooler and pull out two bottles. What is the probability both are Bells?

a) 0.3333

b) Who cares? I like Miller Light. Draw again.

c) 0.6667

Xd) 0.4314

For the next four questions consider the following situation and the rweb outputs :

Healthy 10-week-old domesticated kittens have an average weight of 24.5 oz. with a standard deviation of 5.25 oz. The distribution is approximately normal. A kitten is designated as dangerously underweight when, at 10 weeks, it weighs less than 10.0 oz.

```
Rweb:> # CUMULATIVE NORMAL DISTRIBUTION
Rweb:> pnorm(12, 24.5, 5.25)
[1] 0.008633972

Rweb:> # CUMULATIVE NORMAL DISTRIBUTION
Rweb:> pnorm(10, 5.25, 24.5)
[1] 0.5768641

Rweb:> # NORMAL PERCENTAGE POINT
Rweb:> qnorm(.25, 24.5, 5.25)
[1] 20.95893

Rweb:> # CUMULATIVE NORMAL DISTRIBUTION
Rweb:> pnorm(10, 24.5, 5.25)
[1] 0.002873262

Rweb:> # NORMAL PERCENTAGE POINT
Rweb:> qnorm(.25, 5.25, 24.5)
[1] -11.275

Rweb:> # NORMAL PERCENTAGE POINT
Rweb:> qnorm(.75, 24.5, 5.25)
[1] 28.04107

Rweb:> # NORMAL PERCENTAGE POINT
Rweb:> qnorm(.75, 5.25, 24.5)
[1] 21.775
```

14. What proportion of healthy kittens will be designated as dangerously underweight?

(a). 0.5768

X(b). 0.00287

(c). 0.00863

(d). 1.0000

15. What proportion of kittens have weight between 10.0 oz and 12.0 oz.

(a). 0.00863

X(b). 0.00576

(c). 0.00287

(d). 0.576

16. What are the first and third quartiles of the kitten weights?

(a). 0.008633 , 0.002873

(b). -11.275 , 21.775

(c). 21.775, -11.275

X(d). 20.9589 , 28.04107

17. What is the interquartile range (IQR) for the kitten weights?

X(a). 7.08217

(b). 10.520

(c). -7.08217

(d). 33.030

18. The number of telephone calls to an office in one hour has a Poisson distribution with mean of 80. Use the following R-web printout to find the probability that during a one hour period on Thursday, the number of calls will be more than 86.

```
Rweb:> # CUMULATIVE POISSON DISTRIBUTION
Rweb:> ppois(85, 80)
[1] 0.7345128

Rweb:> # POISSON PROBABILIY
Rweb:> dpois(85, 80)
[1] 0.03709261

Rweb:> # CUMULATIVE POISSON DISTRIBUTION
Rweb:> ppois(86, 80)
[1] 0.7690175

Rweb:> # POISSON PROBABILIY
Rweb:> dpois(86, 80)
[1] 0.03450476
```

(a). 0.03709

(b). 0.26548

X(c). 0.23098

(d). 0.769017

19. A fair six-sided die is rolled. Let A be the event the number on the side up is less then 4. What is the complement of the event A?

a) 1,2,3,4,5,6

Xb) 4,5,6

c) 1,2,3

d) 1,2,3,4

The next two questions refer to the following situation. Suppose X is the number spun on a s pinner with the numbers 0, 2, 12 on it. Suppose the probability of a 0 is 1/4, of 2 is 1/2, of 12 is 1/4.

20. What is the mean of X?

a) 4.67

Xb) 4

c) 7

d) 2

21. What is the variance of X?

a) 12

b) 4.47

Xc) 22

d) 4

22. For a normal probability model what percentage of data fall within two standard deviation's from the mean?

(a). 50.0%

(b). 68%

(c). 99.5%

X(d). 95%

For the next 3 questions consider the following situation and R-web printout:

A poll of twenty voters is taken in large city. The purpose is to determine X, the number in favor of a particular candidate for mayor. Suppose that 60% of all the city's voters favor this candidate.

```
Rweb:> # CUMULATIVE BINOMIAL DISTRIBUTION
Rweb:> pbinom(11, 20, .6)
[1] 0.4044013

Rweb:> # BINOMIAL PROBABILITY
Rweb:> dbinom(11, 20, .6)
[1] 0.1597385

Rweb:> # CUMULATIVE BINOMIAL DISTRIBUTION
Rweb:> pbinom(12, 20, 0.6)
[1] 0.5841071

Rweb:> # BINOMIAL PROBABILITY
Rweb:> dbinom(12, 20, .6)
[1] 0.1797058
```

23. The mean and standard deviation of X are

    (a). 12 , 4.8

    X(b). 12 , 2.19

    (c). 4.8 , 12

    (d). 60 , 2.19

24. The probability that X equals 11 is

    (a). 0.4044

    X(b). 0.1597

    (c). 0.8403

    (d). 0.0055

25. The probability that X at least 12 is

    X(a). 0.5955

    (b). 0.5841

    (c). 0.4044

    (d). 0.5841