Stat 160 MidTerm Exam
Fall 2006
October 26, 2006
Form A
There are 25 problems. Select the best answer to each problem.

The next two questions refer to this situation: The yield in apples from a certain variety of an apple tree is normally distributed with mean 15 bushels and standard deviation 3 bushels.

1. What percentage of trees produce between 12 and 18 bushels of apples?

a) 50%
b) 95%
c) X 68%
d) 99%

2. The median production of a tree is

a) 3 bushels
b) 50%
c) 1.34σ
d) X 15 bushels

The next two questions refer to the following situation: Let X denote the number spun on a fair spinner with the numbers 3 ,4, and 5 on it.

3. Determine the probability model of X.

a)

3	4	5
$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$

b)

3	4	5
$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$

c)

1	2	3
$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$

d) X

3	4	5
$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$

4. Determine the mean (μ) of this probability model.

a) 10
b) X 4
c) 1
d) 6

The next two questions refer to the following: In a study that was used to predict the Fuel Consumption (mi/gal) of a car based on the Weight (lbs.) of the car, the scatterplot revealed a linear relationship between the two variables. The best line that fit the data was found to be:

$$\hat{Y} = 54.7 - 0.00797X$$

5. Which of the following statements is the correct interpretation of the slope?

a) As the fuel consumption increases by 0.00797 mi/gal, the weight of the car decreases by 54.7 lbs.

b) As the weight of the car increases by 0.00797 lbs, then the fuel consumption increases by 54.7 mi/gal

c) As the weight of the car increases by 1 lbs, the fuel consumption increases by 54.7 mi/gal.

d) X As the weight of the car increases by 1 lbs, then the fuel consumption decreases by 0.00797 mi/gal

6. A car that weighs 4,652 lbs is predicted to have which of the following fuel consumption rates?

a) X 17.62 mi/gal

b) 91.76 mi/gal

c) 54.7 mi/gal

d) 50.99 mi/gal

The next four questions refer to the following situation: It is observed that in a small village in China the probability of a woman giving birth to a female child is 0.2. A young couple decides that they will have four children.

7. What is the probability that the couple will have only boys?

a) 0.0016

b) 0.8

c) X 0.4096

d) 0.625

8. What is the probability that the couple will have at least on girl?

a) X 0.5904

b) 0.8

c) 0.9984

d) 0.9735

9. We wish to simulate 100 trials of this situation using the class code for resampling. Which of the following

is the correct way to model the problem?

a) Number of Trials = 100
Minimum Value = 0
Maximum Value = 4
Number to be Drawn = 4
Without Replacement

b) Number of Trials = 100
Minimum Value = 0
Maximum Value = 9
Number to be Drawn = 4
Without Replacement

c) Number of Trials = 4
Minimum Value = 0
Maximum Value = 9
Number to be Drawn = 100
Without Replacement

d) X Number of Trials = 100
Minimum Value = 0
Maximum Value = 9
Number to be Drawn = 4
With Replacement

10. Assume that the estimate for having at least one girl from the above resampling is 0.71. What is the error associated with this estimate?

a) 0.00908

b) X 0.09075

c) 0.04538

d) 0.00454

The next three questions refer to the following stem-leaf plot:
The 2 | 2 stands for the number 22.

```
2 | 2
3 | 5
4 | 4 4
5 | 3 8
6 | 0 3 6 7
7 | 1 3 4 5 7 8 8 9
8 | 2 3 5 5 8
9 | 2 3 6
```

11. What is the shape of the above data set?

a) X Left skewed

b) Right skewed

c) Symmetric

d) Uniform

12. How many data points is the stem-leaf displaying?

a) n=23

b) X n=26

c) n=7

d) n=8

13. According to the stem-leaf plot, what is the median of the sample?

a) 70.04

b) X 74.5

c) 50%

d) 74

14. A study was performed to see how newborn infants weights were affected by those women who smoked during their pregnancy. The scatterplot of the number of cigarettes smoked vs. the weight of the newborn infant indicated that there was a linear relationship between the two variables. The correlation coefficient between the number of cigarettes that a women smoked during the pregnancy and the birth weight of the newborn infant was found to be -0.884. This correlation coefficient indicates which of the following:

a) There is is little to no linear relationship between the number of cigarettes that a pregnant woman smokes and the birth weight of the newborn infant.

b) X A strong negative linear relationship between the number of cigarettes that a pregnant woman smokes and the birth weight of the newborn infant.

c) A strong positive linear relationship between the number of cigarettes that a pregnant woman smokes and the birth weight of the newborn infant.

d) A weak positive linear relationship between the number of cigarettes that a pregnant woman smokes and the birth weight of the newborn infant.

15. What measure (or measures) of center is (or are) robust?

a) The sample median only

b) The sample mean and the Hodges-Lehman estimate

c) The sample mean only

d) X The sample median and the Hodges-Lehman estimate

The next four questions concern the following situation: A standardized exam for math competency has a mean of 70 and a standard deviation of 12. The following printout from Rweb will be of help.

```
Rweb:> # CUMULATIVE NORMAL DISTRIBUTION
Rweb:> pnorm(75, 70, 12)
[1] 0.6615389
Rweb:> # CUMULATIVE NORMAL DISTRIBUTION
Rweb:> pnorm(62, 70, 12)
[1] 0.2524925
Rweb:> # CUMULATIVE NORMAL DISTRIBUTION
Rweb:> pnorm(62, 75, 12)
[1] 0.1393302
Rweb:> # NORMAL PERCENTAGE POINT
Rweb:> qnorm(.35, 70, 12)
```

```
[1] 65.37615
Rweb:> # NORMAL PERCENTAGE POINT
Rweb:> qnorm(.15, 70, 12)
[1] 57.5628
Rweb:> # NORMAL PERCENTAGE POINT
Rweb:> qnorm(.85, 70, 12)
[1] 82.4372
Rweb:> # NORMAL PERCENTAGE POINT
Rweb:> qnorm(.65, 70, 12)
[1] 74.62385
```

16. Determine the probability that a person taking the exam scores at least 75.

a) 0.5000

b) X 0.3385

c) 0.6615

d) 0.2524

17. Determine the probability that a person taking the exam scores between 62 and 75.

a) X 0.4091

b) 0.6615

c) 0.2524

d) 0.5000

18. Suppose a person needs to score in the top 15% to be accepted at Smith College. Find the lowest score he/she could make and still get into Smith College.

a) 70

b) 74.6238

c) X 82.4372

d) 57.5628

19. Suppose Johnny makes the $65th$ percentile on the exam. What score did Johnny get?

a) X 74.6238

b) 57.5628

c) 70

d) 82.4372

20. The median price of a home in the town of Oldberg is \$180,000. Which of the following statements is true?

a) The average price of a house in Oldberg is \$180,000.

b) Houses are far too expensive in Oldberg.

c) X Half of the houses in Oldberg sell for under \$180,000.

d) The standard deviation is required.

21. A data set containing 56 data values resulted in the following 5 basic descriptive statistics: Min = 3, Q1 = 14.2, Q2 = 17.3, Q3 = 21.8, and Max = 34.1. Using the 5 basic descriptive statistics, outliers would be data values that are above what value?

a) 21.8

b) X 33.2

c) 34.1

d) 11.4

The next two questions refer to the following situation: The mean lifetime of a certain species of rat is 2.4 years with standard deviation 0.6 years. A random sample of size $n = 36$ of these rats were selected. The following printout from Rweb will be of help.

```
Rweb:> # CUMULATIVE NORMAL DISTRIBUTION
Rweb:> pnorm(2.6,2.4,.6)
[1] 0.6305587
Rweb:> # CUMULATIVE NORMAL DISTRIBUTION
Rweb:> pnorm(2.6,2.4,.1)
[1] 0.9772499
Rweb:> # CUMULATIVE NORMAL DISTRIBUTION
Rweb:> pnorm(2.3,2.4,.6)
[1] 0.4338162
Rweb:> # CUMULATIVE NORMAL DISTRIBUTION
Rweb:> pnorm(2.3,2.4,.1)
[1] 0.1586553
```

22. Determine the probability that the sample average lifetime of a rat exceeds 2.6 years.

a) 0.6305

b) X 0.0228

c) 0.9772

d) 0.3695

23. Determine the probability that the sample average lifetime of a rat is between 2.3 and 2.6 years.

a) X 0.8186

b) 0.4338

c) 0.1967

d) 0.1586

The next two questions refer to this situation: When you go to a bank, you notice that there are, on average, 5 people in line, Let A denote the event that there are four people in line. Let B denote the event that there are at most two people in line. The following is RWEB output that you will need to answer the next two questions:

```
Rweb:>  # CUMULATIVE POSSON DISTRIBUTION
Rweb:>  ppois(2,5)
[1]  0.1247
Rweb:>  # CUMULATIVE POSSON DISTRIBUTION
Rweb:>ppois(4,5)
[1]  0.4405
Rweb:>  # CUMULATIVE POSSON DISTRIBUTION
Rweb:>  ppois(2,25)
```

```
[1]  0.0000
Rweb:>  # POISSON PROBABALITY
Rweb:>  ppois(2,5)
[1]  0.0842
Rweb:>  # POISSON PROBABALITY
Rweb:>  ppois(4,5)
[1]   0.1755
Rweb:>  # POISSON PROBABALITY
Rweb:>  ppois(4,25)
[1]   0.0000
```

24. The probability of A occurring is:

a) X 0.1755

b) 0.0067

c) 0.4405

d) 0.0000

25. The probability of B occurring is:

a) 0.4405

b) 0.0000

c) X 0.1247

d) 0.0842