

Stat 160 MidTerm Exam
Spring 2006
February 23, 2006
Form B

There are 25 problems. Select the best answer to each problem.

The next two questions refer to the following: The quality control manager of "C is for Cookies Company" is inspecting a batch of chocolate-chip cookies that has just been baked. If the production process is in control, the average number of chip parts per cookie is 6.0. Use the following class code to answer the questions.

```
Rweb:> # CUMULATIVE POISSON DISTRIBUTION
Rweb:> ppois(4, 6)
[1] 0.2850565
Rweb:> # POISSON PROBABILITY
Rweb:> dpois(5, 6)
[1] 0.1606231
Rweb:> # CUMULATIVE POISSON DISTRIBUTION
Rweb:> ppois(5, 6)
[1] 0.4456796
Rweb:> # CUMULATIVE POISSON DISTRIBUTION
Rweb:> ppois(2, 6)
[1] 0.0619688
Rweb:> # POISSON PROBABILITY
Rweb:> dpois(2, 6)
[1] 0.04461754
```

1. What is the probability that in any particular cookie five or more chip parts will be found?

- a) 0.8394
- b) 0.5543
- c) 0.1606
- d) X 0.7149

2. What is the probability that in any particular cookie only 2 chip parts will be found?

- a) 0.9380
- b) 0.0
- c) 0.0620
- d) X 0.0446

The next three questions refer to the following situation. In an attempt to determine the amount of time students of Stat 160 need to take a postquiz a random sample of 11 students was gathered. The postquiz times for the 11 students are: 40 55 20 30 34 30 31 38 31 35 38

3. What is the sample median?

- a) 34.7
- b) 8.66
- c) 20
- d) X 34

4. Which of the following answers is true?
- a) There are no outliers
 - b) Both 20 and 55 are outliers
 - c) X 55 is an outlier
 - d) 20 is an outlier
5. What is the sample range?
- a) -2
 - b) 8
 - c) X 35
 - d) 8.66
6. Which of the following is a measure of linear relationship?
- a) X Sample correlation coefficient
 - b) Sample median
 - c) Sample mean
 - d) Sample standard deviation

The next two questions refer to the following story: Plastic bags used for packaging produce are manufactured so that the breaking strength of the bag is normally distributed with a mean of 5 pounds per square inch and a standard deviation of 1.5 pounds per square inch. Use the RWEB output to answer the following questions.

```
Rweb:> # CUMULATIVE NORMAL DISTRIBUTION
Rweb:> pnorm(3, 5, 1.5)
[1] 0.09121122
Rweb:> # CUMULATIVE NORMAL DISTRIBUTION
Rweb:> pnorm(4, 5, 1.5)
[1] 0.2524925
Rweb:> # CUMULATIVE NORMAL DISTRIBUTION
Rweb:> pnorm(5, 5, 1.5)
[1] 0.5
Rweb:> # CUMULATIVE NORMAL DISTRIBUTION
Rweb:> pnorm(6, 5, 1.5)
[1] 0.7475075
```

7. What is the probability that the bags produced have a breaking strength between 3 and 5 pounds per square inch?
- a) X 0.4088
 - b) 0.9088
 - c) 0.5912
 - d) 0.0912
8. What is the probability that the bags produced have a breaking strength of at least 6 pounds?
- a) 0.2475
 - b) 0.5
 - c) 0.9088
 - d) X 0.2525

9. Which of the following statements is NOT TRUE?
- a) A random scatter in a residual plot indicates a good fit.
 - b) The Hodges-Lehmann estimate is less sensitive to outliers than least squares estimate.
 - c) The correlation coefficient is computed using the sample covariance and the standard deviations of the two variables.
 - d) X The existence of a definite pattern in the residual plot indicates a good model.
10. Which of the following is(are) TRUE?
- I. Under the normal distribution the probability to the left of the Mean is equal to $1/2$.
 - II. The Poisson distribution is an example of a discrete probability model.
- a) II only
 - b) Neither I nor II
 - c) X Both I and II
 - d) I only

The next two questions refer to the story: Fred the big time gambler, lost the following amounts of money in four nights of playing poker: 10, 12, 16, 180

11. Determine the Hodges-Lehmann estimate of loss for Fred.
- a) X 15
 - b) 14
 - c) 54.5
 - d) 83.7
12. Suppose Fred was lying about the \$180 loss and that it really was an \$18,000 loss. So replace the 180 by 18,000, Which of the following statements is true?
- a) The median changes
 - b) Both the mean and the Hodges-Lehmann estimate change
 - c) X The mean changes
 - d) The Hodges-Lehmann estimate changes

The next three questions refer to the following story: A drug is known to be 80% effective in curing a certain disease. Suppose the drug is administered to three patients having the disease and that the cure-noncure results are recorded.

13. What is the probability that exactly one patient will be cured?
- a) 0.1
 - b) X 0.096
 - c) 0.2
 - d) 0.16
14. What is the probability that all three patients will be cured?
- a) 0.8
 - b) 0.2
 - c) X 0.512
 - d) 0.64

15. What is the probability that at least two patients will be cured?
- a) 0.512
 - b) 0.384
 - c) X 0.896
 - d) 0.2

The next three questions refer to: Items coming off a production line are categorized as good (G), slightly blemished (B), and defective (D). Suppose that four items will be randomly selected for inspection and the selection is without replacement. Suppose the company decides to estimate probabilities based on the following 7 resampling trials:

Trial 1: G G B B
 Trial 2: D G B G
 Trail 3: D D B B
 Trial 4: B G D B
 Trial 5: D G G G
 Trial 6: B D D B
 Trial 7: G D G B

16. What is the probability that at most one item is defective?
- a) 0.857
 - b) 0.222
 - c) X 0.714
 - d) 0.143
17. What is the probability that the second item is a good item?
- a) 0.429
 - b) 0.9
 - c) 0.345
 - d) X 0.571
18. What is the error associated with the last probability?
- a) 0.244
 - b) X 0.374
 - c) 0.0699
 - d) 0.0345

The next two questions refer to the following: Maria goes to the grocery store and purchases a sack of 5 dozen apples. Based on previous experience, she knows that 5% of the apples of this brand will be bruised and inedible. Assume that the apples are randomly put in the sack. Use the RWEB output to answer the following questions.

```
Rweb:> # BINOMIAL PROBABILITY
Rweb:> dbinom(0, 60, 0.05)
[1] 0.0460698
Rweb:> # CUMULATIVE BINOMIAL DISTRIBUTION
Rweb:> pbinom(1, 60, 0.05)
[1] 0.1915534
Rweb:> # BINOMIAL PROBABILITY
Rweb:> dbinom(1, 60, 0.05)
[1] 0.1454836
```

19. What is the probability that in her sack she has at least 1 bad apple?

- a) 0.1455
- b) 0.0461
- c) X 0.9539
- d) 0.1916

20. What is the average number of bad apples in the sack she purchased?

- a) 57
- b) X 3
- c) 0.25
- d) 10

The next five questions refer to the following situation: In a study to determine relationship between the amount of tip (in dollars) and the amount of bill (in dollars), the estimated (least squares) regression equation and its associated R-squared value were obtained as follows: Predicted TIP = $-0.74 + 0.16 * \text{BILL}$, $R^2 = 85.23\%$.

21. What is the response variable in this situation?

- a) Both Tip and Bill
- b) Bill
- c) X Tip
- d) Either Tip or Bill

22. Interpret the slope estimate.

- a) X As the amount of bill increases by \$1, the average amount of tip increases by \$0.16.
- b) As the amount of bill decreases by \$1, the average amount of tip increases by \$0.16.
- c) As the amount of bill increases by \$1, the average amount of tip increases by \$0.74.
- d) As the amount of bill decreases by \$1, the average amount of tip decreases by \$0.74.

23. Using the estimated regression equation, what is the predicted amount of tip when the bill is \$55.50?

- a) X \$8.14
- b) \$3.50
- c) \$9.54
- d) \$7.26

24. What is the residual when the amount of bill is \$100.00 and tip is \$17.00?

- a) X \$1.74
- b) \$91.86
- c) \$0.74
- d) \$0.00

25. Which of the following is a true statement?

- a) X About 85.23% of the variation in tip is explained by bill.
- b) About 85.23% of the variation in bill is explained by tip.
- c) The expected amount of tip \$0.16 when bill is \$0.00.
- d) Bill and tip are negatively related.