Key

STAT:1010

Exam 2 Practice Test

100 possible points

1. The following data describe the length (in mm) of five grasshoppers: 81, 81, 81, 80, 82. What is the sample standard deviation s of these data?

   (a) 1.00

   (b) 0.632

   (c) 0.400

   (d) 0.500

   (e) 0.707

$n=5$

$\bar{x}$ = sample mean $= \frac{81+81+\ldots+82}{5} = 81$

$s = \sqrt{\frac{(81-81)^2+(81-81)^2+\ldots+(82-81)^2}{4}} = \sqrt{\frac{2}{4}}$

$= 0.707$

2. You pay \$4 to play a dice game where one 6-sided die is rolled. If you roll a 1 or 2, you get \$4. If you roll a 3 or 4, you get \$7. Otherwise, you get nothing. What is the expected value of the game for you?

   (a) \$1.33

   (b) −\$0.33

   (c) −\$0.66

   (d) −\$7.66

   (e) Impossible to determine with the given information

option 1: $\frac{1}{3}(0)+\frac{1}{3}(3)+\frac{1}{3}(-4) = -\frac{1}{3} = -0.33$

option 2: $\frac{1}{3}(4)+\frac{1}{3}(7)-4 = -0.33$

3. Consider a quantitative variable we will call X. The probability distribution for X is partially completed below.

x	0	1	2	3
$P(X=x)$	0.1	p	0.2	0.5

← must sum to 1

Answer the following two questions: What is p? What is $P(X>1)$?

   (a) $p = 0.2, P(X>1) = 0.7$

   (b) $p = 0.2, P(X>1) = 0.9$

   (c) $p = 0.4, P(X>1) = 0.7$

   (d) $p = 0.4, P(X>1) = 0.9$

   (e) None of the above

$P(X>1) = P(X=2)+P(X=3)$

$= 0.2+0.5$

$= 0.7$

4. Suppose A and B are two events where $P(A) = 0.2, P(B) = 0.6$, and $P(A \text{ or } B) = 0.7$. What is $P(A \text{ and } B)$?

   (a) 0.9

   (b) 0.8

   (c) 0.1

   (d) 0.3

   (e) Impossible to determine with the given information

$P(A \text{ or } B) = P(A)+P(B)-P(A \text{ and } B)$

$\Rightarrow P(A \text{ and } B) = P(A)+P(B)-P(A \text{ or } B)$

$= 0.2+0.6-0.7$

$= 0.1$

5. Which of the following is/are true?

(a) For any event A, $P(A) + P(A') = 0$ No $P(A)+P(A') = 1$

(b) For any events A and B, $P(A|B) = 1 - P(A|B')$ $P(A|B)$ is the complement to $P(A'|B)$

(c) An *outcome* is a collection of one or more events

(d) All of the above

(e) None of the above

6. A bowl contains 1 red (R), 1 blue (B), and 3 green (G) chips. Suppose two chips are drawn at random **without** replacement. Given that the first chip is red, find the probability that the second chip is blue (i.e. find $P(B_2|R_1)$).

(a) 0.200

(b) 0.250

(c) 0.428

(d) 0.800

(e) 0.950

5 chips in all

$P(B_2|R_1) = \frac{1}{4}$

7. Consider the following two data sets:

A: 0.02, 0.02, 0.07, 0.05 in order already

B: 1.25, 0.32, 1.17, 1.26 → put in order 0.32, 1.17, 1.25, 1.26

Which of the following is/are true? (Hint: no calculations are necessary)

(a) The range of A is greater than the range of B 0.03 vs. 0.94

(b) The standard deviation of B is more than the standard deviation of A due to outlier

(c) The distribution of B is skewed to the right outlier is to the left

(d) Both (a) and (b)

(e) Both (a) and (c)

8. Consider the following stem and leaf plot:

Stem	Leaves
7	66799
8	
9	5
10	56

$n = 8$

median = 79

$Q_1 = 76.7$

$Q_3 = 100$

mean = 86.63

skewed right

Which of the following is true?

(a) $Q_1 = 79$ and the distribution is skewed to the right

(b) $Q_1 = 76.7$ and the distribution is skewed to the left

(c) $Q_3 = 100$ and the distribution is skewed to the left

(d) $Q_3 = 79$ and the distribution is skewed to the right

(e) None of the above

9. Which of the following is true?
   (a) The standard deviation s can be less than 0
   (b) The interquartile range can be less than 0
   (c) If the standard deviation s equals zero, then all the data *must* equal zero
   (d) The range is always greater than or equal to the interquartile range
   (e) None of the above

10. Suppose C and D are two events where $P(C) = 0.5$, $P(D) = 0.2$, and $P(C|D) = 0.2$. Are C and D independent? Why?
   (a) Independent because $P(C|D) = P(D)$
   (b) Independent because $P(C|D) \neq P(C)$
   (c) Not independent because $P(C|D) = P(D)$
   (d) Not independent because $P(C)P(D) \neq P(C|D)$
   (e) None of the above

11. Suppose that 20% of people wear contact lenses (i.e. $P(C) = 0.20$). If 2 people are randomly selected from this very large population, find the probability that neither wears contact lenses. *Assume independence.*
   (a) 0.04
   (b) 0.40
   (c) 0.64
   (d) 0.80
   (e) 1.60

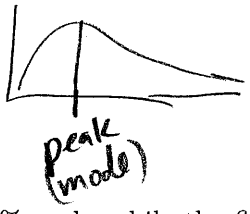
12. In reference to question (11) above, if 2 people are randomly selected, find the probability that the first person *or* the second person wears contacts, i.e. find $P(C_1 \text{ or } C_2)$.
   (a) 0.04
   (b) 0.32
   (c) 0.36
   (d) 0.40
   (e) 0.80

13. Consider the following dataset: 2, 7, 8, 10, 13, 22, 22, 25
   Which of the following is/are true?
   (a) IQR=13.75
   (b) IQR=14.5
   (c) Mode=11.5
   (d) Both (a) and (c)
   (e) None of the above

14. Suppose the mean is equal to 88 in a graph which is skewed to the right. Which of the following is/are true?

(a) The mode will be less than 88
(b) The mode will be more than 88
(c) The median will be more than 88
(d) Both (b) and (c)
(e) None of the above

mean = 88
skewed right



15. In a college course, suppose the first and second exams are worth 30% each, while the final exam is worth 40%. If a student received an 80 on the first exam, a 65 on the second exam, and a 50 on the final exam, what is his/her overall mean (average)?

(a) 65.0
(b) 80.0
(c) 63.5
(d) 66.7
(e) 59.5

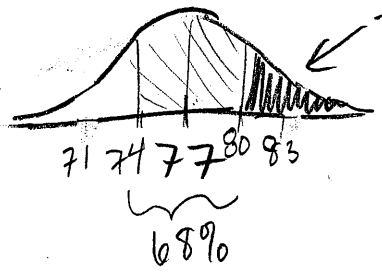
Weighted mean:

$80(.30) + 65(.30) + 50(.40)$

$= 24 + 19.5 + 20 = 63.5$

16. Among females in the US, diastolic blood pressures, X, are normally distributed with mean $\mu = 77$ mm Hg and standard deviation $\sigma = 3$ mm Hg. According to the empirical rule, what percentage of women have a diastolic blood pressure *higher* than 80 mm Hg?

(a) 2.5%
(b) 16%
(c) 68%
(d) 95%
(e) 97.5%



$\frac{1}{2}$ of 32%
so 16%

17. In reference to question (16) above, what is the standard score for a blood pressure measurement of 70 mm Hg?

(a) 7.00
(b) −2.33
(c) 77.00
(d) 2.33
(e) 1.5

$$z = \frac{\text{data value} - \text{mean}}{\text{std. dev.}}$$

$$= \frac{70 - 77}{3} = \frac{-7}{3} = -2.33$$

18. Which of the following is/are true?

(a) If events A and B are nonoverlapping (i.e. mutually exclusive), then they must be independent

(b) If events A and B are nonoverlapping, then $P(A \text{ or } B) = 0$

(c) If events A and B are independent, then $P(A)/P(B) = P(A|B)$ → if independent, $P(A) = P(A|B)$

(d) If events A and B are nonoverlapping, then $P(A|B) = 0$

(e) Both (a) and (d) (See graphic)

19. An insurance company charges \$500 for a life insurance policy. Past experience has shown that 1 in 10,000 policy olders will die, forcing the insurance company to pay \$1,000,000 to the policy holders beneficiary. Also, 1 in 5,000 policy holders will loose a limb, forcing the insurance company to pay \$100,000 to the policyholder. If the policyholder does not die or loose a limb, the company pays out nothing. On average, how much does the insurance company profit per policy?

(a) \$380.00

(b) \$120.00

(c) \$175.00

(d) \$225.00

(e) \$425.00

option 1: $\left(\frac{1}{10,000}\right)(-\$999,500) + \left(\frac{1}{5,000}\right)(-\$99,500) + \left(\frac{9997}{10,000}\right)(\$500) = \$380$

option 2: $500 - \left(\frac{1}{10,000}\right)(\$1,000,000) - \left(\frac{1}{5000}\right)(\$100,000) = \$380$

20. Suppose a die is rolled one time, and then a coin is flipped one time. Consider the following events: 1,2,3,4,5,6 H,T

A = an even is rolled

B = a 3 or 5 is rolled

C = a head is flipped

Which of the following is/are true?

(a) A and B are nonoverlapping? (i.e. mutually exclusive) ✓ can't both happen

(b) A and C are independent ✓

(c) A and C are are nonoverlapping? No, they can both happen

(d) All of the above

(e) Both (a) and (b)