MATH 3307

Homework 3 (Lessons 10 - 11)

Instructions: Answer all questions through the EMCF tab of casa under the assignment named "Homework 3" before the deadline.

There is no "Submit" button. Your answers will be automatically submitted once the deadline arrives.

Assignments will be graded out of 20 points.

For questions 1 to 3, refer to the probability distribution table:

X	1	2	3	4	5	6	7
P(X)	0.15	0.2	0.1	0.2	0.1	0.15	0.1

1. Find $P(X \geq 4)$

    A. 0.35   B. 0.45   C. 0.20   D. 0.55   E. 0.85

2. Find the mean of X.

    A. 3.75   B. 4   C. 0.1429   D. 2.0714   E. 1.50

3. Find the standard deviation of X.

    A. 3.788   B. 1.946   C. 14.349   D. 14.1   E. 3.755

For questions 4 to 6, refer to the following probability distributions

X	-1	0	1	2
P(X)	0.3	0.1	0.5	0.1

Y	2	3	5
P(Y)	0.6	0.3	0.1

4. Find the mean, variance, and standard deviation of X.

    A. Mean: 0.5; Variance: 0.64; Standard Deviation: 0.8

    B. Mean: 0.25; Variance: 1.04; Standard Deviation: 1.08

    C. Mean: 0.4; Variance: 1.04; Standard Deviation: 1.08

    D. Mean: 0.3; Variance: 1.07; Standard Deviation: 1.14

    E. Mean: 0.4; Variance: 1.04; Standard Deviation: 1.02

5. Find the mean, variance, and standard deviation of Y.

    A. Mean: 3.33; Variance: 1.03; Standard Deviation: 1.01

    B. Mean: 2.6; Variance: 0.84; Standard Deviation: 0.706

    C. Mean: 2.6; Variance: 0.84; Standard Deviation: 0.917

    D. Mean: 2.6; Variance: 0.706; Standard Deviation: 0.84

    E. Mean: 0.33; Variance: 0.076; Standard Deviation: 0.276

6. For a distribution, W = 3 + 2X, find the mean, variance, and standard deviation of W.

    A. Mean: 3.4; Variance: 4.16; Standard Deviation: 2.08

    B. Mean: 2.0; Variance: 2.08; Standard Deviation: 4.33

    C. Mean: 3.8; Variance: 2.08; Standard Deviation: 1.44

    D. Mean: 3.8; Variance: 4.16; Standard Deviation: 2.04

    E. Mean: 3.8; Variance: 4.16; Standard Deviation: 17.31

Use the following Probability Distribution Table to answer questions 7, 8, and 9.

In the following distribution, $P(X < 2) = 0.35$, and expected value is 1.9

X	0	1	2	3	4
P(X)	0.10	A	0.35	B	C

7. Use the fact that P(X < 2) = 0.35 to find the value of A.

A. 0.00   B. 0.25   C. 0.15   D. 0.10   E. 0.05

8. Determine the value of B. *(Hint: you will want to create two equations: the first using the fact that the total probability is equal to 1.0, and the second using the given expected value, then solve by the substitution method.)*

A. 0.00   B. 0.25   C. 0.15   D. 0.10   E. 0.05

9. Determine the value of C.

A. 0.00   B. 0.25   C. 0.15   D. 0.10   E. 0.05

10. A manufacturer produces a large number of toasters. From past experience, the manufacturer knows that approximately 2% are defective. In a quality control procedure, we randomly select 20 toasters for testing. We want to determine the probability that no more than one of these toasters is defective.

    A. Binomial distribution, n = 20; p = 0.02, 2 outcomes, independent trials

    B. Not Binomial, n = 20, p is not fixed, 2 outcomes, dependent trials

    C. Not Binomial, n is unknown; p = 0.02, 2 outcomes, independent trials

    D. Not Binomial, n = 20, p = 0.02, more than 2 outcomes, independent trials

    E. Not Binomial, n = 20, p =0.02, more than 2 outcomes, dependent trials

For questions 11 - 13, refer to the following: A fair coin is flipped 20 times

10. Determine the probability that the coin comes up tails exactly 15 times.
    A. 0.994091   B. 0.014798   C. 0.005909

        D. 0.985214   E. 0.176917

12. Determine the probability that the coin comes up tails at least 15 times.

    A. 0.979305   B. 0.036964   C. 0.963036

        D. 0.020695   E. 0.073929

13. Find the mean and standard deviation for the random variable X giving the number of tails in this coin flipping experiment.
A. Mean: 5; Standard Deviation: 2.5   B. Mean: 10; Standard Deviation: 2.236
C. Mean: 5; Standard Deviation: 1.581   D. Mean: 10; Standard Deviation: 5
E. Mean: 10; Standard Deviation: 2.5

For questions 14 - 16, refer to the following: According to government data, 20% of employed women have never been married. If 10 employed women are selected at random, what is the probability that:

14. Exactly 2 have never been married?

15. At most 2 have never been married?

16. At least 8 have been married?

Choices for Questions 14, 15, and 16:

A. 0.67780

B. 0.69801

C. 0.99992

D. 0.30199

E. 0.0000793

Use the following scenario for questions 17 and 18:

A fair, six-sided die is rolled three times.

17. Determine the values of w, x, y, and z in the probability distribution table, where event X represents the number of times of die lands on a 6.

X	0	1	2	3
P(X)	w	x	y	z

A. w = 0.25; x = 0.25; y = 0.25; z = 0.25

B. w = 0.167; x = 0.167; y = 0.167; z = 0.167

C. w = 0.0; x = 0.167; y = 0.333; z = 0.5

D. w = 0.579; x = 0.347; y = 0.069; z = 0.005

E. w = 0.579; x = 0.074; y = 0.005; z = 0.00

18. Determine the expected number of times the die should land on 6.

A. 2   B. 3   C. 0.167   D. 0.5   E. 1.5

19. A manufacturer of light bulbs knows that, out of every package of 5 sold, there is an expectation that 1 will be defective. A customer purchases 3 of these packages (a total of 15 light bulbs). What is probability that at most 2 are defective?

   A. 0.6020   B. 0.3980   C. 0.0037   D. 0.6482   E. 0.0176

20.   In the following distribution, calculate the mean, and standard deviation:

x	0	1	2	3	4
p(x)	.5	.3	.15	.03	.02

Proposed Solution:

assign("x",c(0,1,2,3,4))

mean(x) = 2

   What was done wrong in the proposed solution?
      A. The mean should be taken of the p(x) entries as well as the x entries.

      B. Since this is a probability distribution table, each x-value carries different weight, which was no considered in the calculation used.

      C. Since the probabilities add up to 1.0, the mean must be 0.5

      D. All values in the table should be added together and then divided by 10.

      E. There is nothing wrong with the proposed calculation.