

Directions: *Work on these sheets.*

Part 1: Multiple Choice. *Circle the letter corresponding to the best answer.*

A psychologist studied the number of puzzles subjects were able to solve in a five-minute period while listening to soothing music. Let X be the number of puzzles completed successfully by a subject. X had the following distribution:

X	1	2	3	4
Probability	0.2	0.4	0.3	0.1

- Using the above data, what is the probability that a randomly chosen subject completes at least 3 puzzles in the five-minute period while listening to soothing music?
 - 0.3
 - 0.4
 - 0.6
 - 0.9
 - The answer cannot be computed from the information given.
- Using the above data, $P(X < 3)$ is
 - 0.3
 - 0.4
 - 0.6
 - 0.9
 - The answer cannot be computed from the information given.
- Using the above data, the mean μ of X is
 - 2.0
 - 2.3
 - 2.5
 - 3.0
 - The answer cannot be computed from the information given.
- Which of the following random variables should be considered continuous?
 - The time it takes for a randomly chosen woman to run 100 meters
 - The number of brothers a randomly chosen person has
 - The number of cars owned by a randomly chosen adult male
 - The number of orders received by a mail order company in a randomly chosen week
 - None of the above

5. Let the random variable X represent the profit made on a randomly selected day by a certain store. Assume that X is normal with mean \$360 and standard deviation \$50. What is the value of $P(X > \$400)$?
- (a) 0.2119
 - (b) 0.2881
 - (c) 0.7881
 - (d) 0.8450
 - (e) The answer cannot be computed from the information given.

Part 2: Free Response

Answer completely, but be concise. Write sequentially and show all steps.

The probability that 0, 1, 2, 3, or 4 people will seek treatment for the flu during any given hour at an emergency room is shown in the distribution.

X	0	1	2	3	4
$P(X)$	0.12	0.25	0.32	0.24	0.06

- 6. What does the random variable count or measure?
- 7. What is the mean of X ?
- 8. What is the variance and standard deviation of X ?
- 9. If a player rolls two dice and gets a sum of 2 or 12, he wins \$20. If the person gets a 7, he wins \$5. The cost to play the game is \$3. Find the expectation of the game.

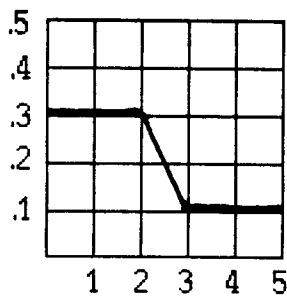
A box contains 5 pennies, 5 dimes, 1 quarter, and 1 half dollar. You reach into the box (without looking) and select a single coin.

10. Identify the random variable. $X =$

11. Construct a probability distribution for this data.

12. If you reach into the box and randomly select one coin, what is the probability you will get something between 5 cents and 35 cents?

Here is the probability distribution function for a continuous random variable.



Determine the following probabilities:

13. $P(0 \leq X \leq 3) =$

14. $P(2 \leq X \leq 3) =$

15. $P(X = 2) =$

16. $P(X < 2) =$

17. $P(1 < X < 3) =$

Suppose that the discrete random variable has the following probability distribution.

X	1	3	5
$P(X)$	1/4	1/4	1/2

18. Find the mean μ_X of X .

19. Find the variance $(s_X)^2$ of X .

20. Define the new random variable $Y = 3X + 1$. Use the properties of the mean of linear functions of random variables and your results in the previous problems to find the mean of Y .

21. Use the properties of the variance of linear functions of random variables to calculate the variance and standard deviation of the new random variable Y .

(1) b (2) c (3) b (4) a (5) a (6) X = the number of people who will seek treatment for the flu during any given hour at an emergency room. (7) $\mu_X = 1.85$ (8) $(\sigma_X)^2 = 1.193$, so $\sigma_X = 1.09$

(9) Let X = payout. Here is a probability distribution table:

X	\$20	\$5	\$0
Dice	2 or 12	7	
$P(X)$	2/36	6/36	28/36

$\mu_X = \$1.94$. (10) X = payout

X	.50	.25	.10	.01
$P(X)$	1/12	1/12	5/12	5/12

(12) $P(.05 < X < .35) = P(X = .10) + P(X = .25) = 6/12 = .5$ (13) 0.8 (14) 0.2 (15) 0 (16) 0.6

(17) 0.5 (18) $\mu_X = 3.5$ (19) $(\sigma_X)^2 = 2.75$ (20) $\mu_Y = 3\mu_X + 1 = 3(3.5) + 1 = 11.5$

(21) $(\sigma_Y)^2 = (\sigma_{3X+1})^2 = 9(\sigma_X)^2 = 9(2.75) = 24.75$. $\sigma_Y = \sqrt{24.75} = 4.975$.