Test 7 AP Statistics Name:

Directions: *Work on these sheets.*

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

1. Suppose X is a random variable with mean μ. Suppose we observe X many times and keep track of the average of the observed values. The law of large numbers says that
(a) The value of μ will get larger and larger as we observe X.
(b) As we observe X more and more, this average and the value of μ will get larger and larger.
(c) This average will get closer and closer to μ as we observe X more and more often.
(d) As we observe X more and more, this average will get to be a larger and larger multiple of μ.
(e) None of the above

2. In a population of students, the number of calculators owned is a random variable X with $P(X = 0) = 0.2$, $P(X = 1) = 0.6$, and $P(X = 2) = 0.2$. The mean of this probability distribution is
(a) 0
(b) 2
(c) 1
(d) 0.5
(e) The answer cannot be computed from the information given.

3. Refer to the previous problem. The variance of this probability distribution is
(a) 1
(b) 0.63
(c) 0.5
(d) 0.4
(e) The answer cannot be computed from the information given.

4. The number of calories in a one-ounce serving of a certain breakfast cereal is a random variable with mean 110. The number of calories in a full cup of whole milk is a random variable with mean 140. For breakfast you eat one ounce of the cereal with 1/2 cup of whole milk. Let Z be the random variable that represents the total number of calories in this breakfast. The mean of Z is
(a) 110
(b) 140
(c) 180
(d) 250
(e) 195

5. The weight of reports produced in a certain department has a normal distribution with mean 60g and standard deviation 12g. What is the probability that the next report will weigh less than 45g?
(a) 0.1042
(b) 0.1056
(c) 0.3944
(d) 0.0418
(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.

A box contains ten $1 bills, five $2 bills, three $5 bills, one $10 bill, and one $100 bill. A person is charged $20 to select one bill.

6. Identify the random variable. X =

7. Construct a probability distribution for this data.

8. Find the expected value.

9. Is the game fair? Explain briefly.

10. If a person rolls doubles when he tosses two dice, he wins $5. If the game is to be fair, how much should the person pay to play the game?

Patients receiving artificial knees often experience pain after surgery. The pain is measured on a subjective scale with possible values of 1 to 5. Assume that X is a random variable representing the pain score for a randomly elected patient. The following table gives part of the probability distribution for X.

X	1	2	3	4	5
P(X)	.1	.2	.3	.3	

11. Find $P(X = 5)$.

12. Find the probability that the pain score is less than 3.

13. Find the mean μ for this distribution.

14. Find the variance for this distribution.

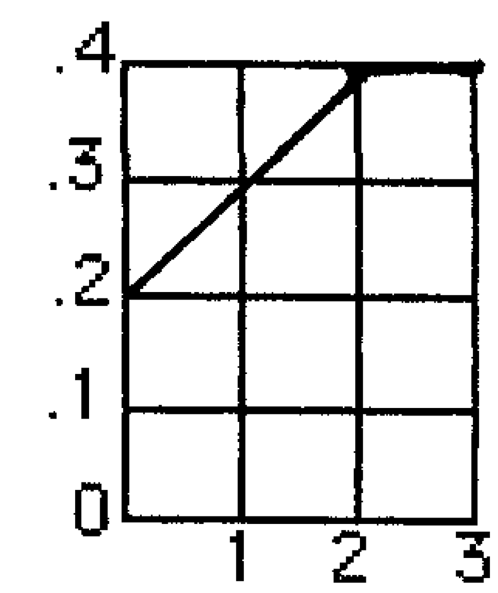
15. Find the standard deviation for this distribution.

16. Suppose the pain scores for two randomly selected patients are recorded. Let Y be the random variable representing the sum of the two scores. Find the mean of Y.

17. Find the standard deviation of Y.

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

Determine the following probabilities:



18. $P(0 \leq X \leq 3)$

19. $P(2 \leq X \leq 3)$

20. $P(X = 2)$

21. $P(X < 2)$

22. $P(1 < X < 3)$

23. 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. The probability is approximately 0.6 that on a randomly selected day the store will make less than______. Solve for the missing amount of profit.

I pledge that I have neither given nor received aid on this test. ____________________________