Classroom Voting Questions:
Statistics

Random Variables

1. Draw the following dart board: A dart board is constructed from three concentric circles with radii 1 inch, 2 inches, and 3 inches, respectively. If a dart lands in the innermost circle, the player receives 4 points. If the dart lands between the innermost circle and the middle circle, the player receives 2 points. If the dart lands between the middle circle and the outermost circle, the player receives 1 point. Assume that the probability of a dart landing in any particular region is proportional to the area of that region.

Define the random variable $X$ to be the sum of the player’s score on two successive throws. Then $X$ is what type of random variable?

(a) discrete
(b) continuous

2. Draw the following dart board: A dart board is constructed from three concentric circles with radii 1 inch, 2 inches, and 3 inches, respectively. If a dart lands in the innermost circle, the player receives 4 points. If the dart lands between the innermost circle and the middle circle, the player receives 2 points. If the dart lands between the middle circle and the outermost circle, the player receives 1 point. Assume that the probability of a dart landing in any particular region is proportional to the area of that region.

Suppose that a player’s score on a single dart throw is defined to be the distance between the dart and the center of the board. Define the random variable $X$ to be the sum of the player’s score on two successive throws. Then $X$ is what type of random variable?

(a) discrete
(b) continuous

3. A radioactive mass emits particles at an average rate of 15 particles per minute. Define the random variable $X$ to be the number of particles emitted in a 10-minute time frame. Then $X$ is what type of random variable?

(a) discrete
(b) continuous
4. A radioactive mass emits particles at an average rate of 15 particles per minute. A particle is emitted at noon today. Define the random variable $X$ to be the time elapsed between noon and the next emission. Then $X$ is what type of random variable?

(a) discrete  
(b) continuous

5. A randomly-selected kindergarten class in a large city will get to have a party on Friday of next week. At one point in the party, each child in the class will receive half of a candy bar. Define the random variable $X$ to be the number of candy bars given out in the class next Friday. Then $X$ is what type of random variable?

(a) discrete  
(b) continuous

6. Consider the continuous random variable $X =$ the weight in pounds of a randomly selected newborn baby born in the United States during 2006. Let $f$ be the probability density function for $X$. It is probably safe to say that $P(X < 0) = 0$ and $P(X < 20) = 1$. Which of the following is not a justifiable conclusion about $f$ given this information?

(a) No portion of the graph of $f$ can lie below the $x$-axis.  
(b) The area under the entire graph of $f$ equals 1.  
(c) The area under the graph of $f$ between $x = 0$ and $x = 20$ is 1.  
(d) The nonzero portion of the graph of $f$ lies entirely between $x = 0$ and $x = 19.$

7. A randomly selected family has two kids. What is the probability that the family has one boy and one girl?

(a) $\frac{1}{2}$  
(b) $\frac{1}{3}$  
(c) $\frac{1}{4}$  
(d) None of the above

8. Two standard, six-sided dice are rolled. What is the probability that the sum of the dice is 6?

(a) $\frac{1}{6}$  
(b) $\frac{5}{6}$  
(c) $\frac{1}{12}$  
(d) $\frac{5}{12}$
9. Two standard, six-sided dice are rolled. What is the most probable sum?

(a) 2
(b) 6
(c) 7
(d) 12

10. Consider rolling a standard, six-sided die. Let $A$ be the event that the number rolled is even. Let $B$ be the event that the number rolled is a multiple of 3. The event $(not B)$ consists of

(a) 1, 3, 5
(b) 1, 2, 4, 5
(c) 2, 4, 6
(d) 1, 3, 5

11. Consider rolling a standard, six-sided die. Let $A$ be the event that the number rolled is even. Let $B$ be the event that the number rolled is a multiple of 3. The event $(A \text{ and } B)$ consists of

(a) 2, 3, 4, 6
(b) 2, 3, 4, 6, 6
(c) 6

12. Consider rolling a standard, six-sided die. Let $A$ be the event that the number rolled is even. Let $B$ be the event that the number rolled is a multiple of 3. The event $(A \text{ or } B)$ consists of

(a) 2, 3, 4, 6
(b) 2, 3, 4, 6, 6
(c) 6

13. A standard, six-sided die is rolled. What is the probability of rolling an even number or a number divisible by 3?
14. A card is drawn at random from a standard deck of 52 playing cards. What is the probability that the card is a red card or a jack?

(a) \( \frac{2}{3} \)
(b) \( \frac{5}{6} \)
(c) 4
(d) 5