Multiple Choice Questions on Probability

Questions 1 and 2 refer to the following situation. The class of 1968 and 1998 held a joint reunion in 2008 at the local high school. Attendees were asked to complete a survey to determine what they did after graduation. Here is the information obtained.

	College	Job	Military	Other
1968	56	73	85	7
1998	173	62	37	20

1. What is the probability that a randomly selected attendee graduated in 1998 and went into the military?

    (A) 0.072
    (B) 0.127
    (C) 0.303
    (D) 0.596
    (E) 0.669

2. What is the probability that a randomly selected 1968 graduate went to college after graduation?

    (A) 0.245
    (B) 0.253
    (C) 0.560
    (D) 0.592
    (E) 0.755

3. A fair die is rolled 3 times. The first 2 rolls resulted in 2 fives. What is the probability of not rolling 5 on the next roll?

    (A) 1

    (B) $\dfrac{5}{6}$

    (C) $\dbinom{3}{1}\left(\dfrac{1}{6}\right)^{2}\left(\dfrac{5}{6}\right)$

    (D) $\left(\dfrac{1}{6}\right)^{2}\left(\dfrac{5}{6}\right)$

    (E) 0

4.   In a game, a spinner with five equal-sized spaces is labeled from A to E. If a player spins an A they win 15 points. If any other letter is spun the player loses 4 points. What is the expected gain or loss from playing 40 games?

  (A)   Gain of 360 points
  (B)   Gain of 55 points
  (C)   Gain of 8 points
  (D)   Loss of 1 point
  (E)   Loss of 8 points

5.   Let X be a random variable whose distribution is normal with mean 30 and standard deviation 4. Which of the following is equivalent to $P(X \geq 26)$?

  (A) $P(X < 34)$
  (B) $P(X \leq 26)$
  (C) $P(26 \leq X \leq 34)$
  (D) $1 - P(X \leq 34)$
  (E) $P(X \geq 34)$

6.   The distribution of heights of male high school students has a mean of 68 inches and variance of 1.52 square inches. The distribution of female high school students has a mean of 66 inches and a variance of 1.64 square inches. If the heights of the male and female students are independent, what is the standard deviation of the difference in their heights?

  (A)   0.12 inches
  (B)   0.35 inches
  (C)   1.48 inches
  (D)   1.78 inches
  (E)   2.24 inches

7.   If $P(A) = 0.34$ and $P(A \text{ or } B) = 0.71$, which of the following is false?

  (A) $P(B) = 0.37$, if A and B are mutually exclusive.
  (B) $P(B) = 0.561$, if A and B are independent.
  (C) $P(B)$ cannot be determined if A and B are neither mutually exclusive nor independent.
  (D) $P(A \text{ and } B) = 0.191$, if A and B are independent.
  (E) $P(A|B) = 0.34$, if A and B are mutually exclusive.

8. In a litter of eight puppies, 5 are female. 2 of the puppies are picked at random. Which of the following is true?

(A) The probability that both puppies are female is $\left(\dfrac{2}{5}\right)^2$.

(B) The probability that both puppies are female is $\left(\dfrac{5}{8}\right)^2$

(C) The probability that both puppies are female is $\left(\dfrac{5}{8}\right)\left(\dfrac{4}{7}\right)$

(D) The expected number of female puppies is 1.25.

(E) The situation can be described by a binomial model.

9. Homes built in the suburbs typically have none to three-car garages. Let X be the number of garage stalls per home found in a sample of 200 homes in a local suburban area. From the data obtained, $P(X = 0) = 0.06$, $P(X = 1) = 0.45$, and $P(X = 2) = 0.32$. Find the mean number of garage stalls per home for the sample of homes.

(A) 1.09
(B) 1.15
(C) 1.5
(D) 1.6
(E) 2

10. The probability that a randomly chosen American is a Republican is 0.35. What is the probability that in a sample of 10 Americans, that at least 1 will be a Republican?

(A) 0.9865
(B) 0.2275
(C) 0.0725
(D) 0.0135
(E) 0.0072

Key to Probability Multiple Choice

1. A $\dfrac{37}{513}$

2. B P(College given 1968 graduation) = 56/221

3. B What happens on the first two rolls does not affect the chance of getting a 5 again.

4. E $E(onegame) = \frac{1}{5}(15) + \frac{4}{5}(-4) = -\frac{1}{5}$. There is an average loss of 8 points over 40 games.

5. A The symmetry of the graph and the continuity give this result.

6. D $\sqrt{1.52 + 1.64} = 1.78$ (the variances are already squared)

7. E Statement is true if mutually exclusive is replaced by independent. Using the formula for $P(A \cup B)$ shows the others are true.

8. C The situation is not binomial because the probability of success is not the same for each trial. A (using an incorrect probability), B, D, and E are based on binomial models.

9. D $E(X) = 0(.06) + 1(.45) + 2(.32) + 3(.17)$

10. A $1 - P(\text{no Republicans in the group of 10}) = 1 - (.65)^{10}$. Here because of the large population from which the sample is drawn, the situation can be modeled with a binomial model. (the 10% rule applies)