1. A card is chosen at random from a standard deck of 52 cards. What are the odds in favor of the card chosen being a face card (J, Q or K of any suit)?

(A) 1:11 (B) 1:12 (C) 3:10 (D) 3:13 (E) none of the above

2. Let $E$ and $F$ be two events that are mutually exclusive. Suppose that $P(E) = .2$ and $P(F) = .4$. Find $P(E^c \cap F^c)$.

(A) 0 (B) .4 (C) .48 (D) 1 (E) none of the above

3. Two standard six sided dice are rolled and the uppermost numbers noted. What is the probability that one of the die shows a 6 or the sum of the uppermost numbers is 9?

(A) 16/36 (B) 15/36 (C) 14/36 (D) 13/36 (E) none of the above

4. A package of 12 jumbo eggs has 2 eggs with double yolks. A sample of 2 is chosen for breakfast. What is the probability of at least one double yolk egg in the sample?

(A) 20/66 (B) 21/66 (C) 1/6 (D) 1/12 (E) none of the above

5. A box contains 10 floppy discs. The probability that a disc is defective is .25%. What is the probability that at least one of the discs in the box is defective?

(A) 2.5% (B) 5.6% (C) 94.4% (D) 97.5% (E) none of the above

6. You choose two cards without replacement from a standard deck of 52 cards. Given the first card chosen was not an ace, what is the probability the second card chosen was an ace?

(A) 3/52 (B) 3/51 (C) 4/51 (D) 4/52 (E) none of the above

7. A multiple choice test has 10 questions, each with 4 possible answers. An unprepared student takes the exam by guessing on each question. What is the probability that the student gets fewer than 4 of the questions correct?

(A) .7759 (B) .9219 (C) .5714 (D) .3000 (E) none of the above

8. A person has a life insurance policy that pays $50,000. The person has a .9915 probability of living for the next year. What is the least the person could expect to pay for this policy? (The insurance company has zero expected profit.)

(A) not enough data (B) $432.31 (C) $425.00 (D) $428.64 (E) none of the above
9. Using the Venn diagram given, what is \( P(B|A^c) \)?

(A) 1  (B) 4/7  (C) 4/5  (D) 2/5  (E) none of the above

10. A bag has 3 gold and 2 silver coins. A cup has 1 gold and 2 silver coins. A coin is drawn at random from the bag and is placed in the cup. A coin is then drawn from the cup. If a gold coin is drawn from the bag, what is the probability that a silver coin was drawn from the cup?

(A) 1/3  (B) 3/5  (C) 3/10  (D) 1/2  (E) none of the above

11. A class has 55 women and 65 men. Of the women in the class, 45% are business majors and of the men, 55% are business majors. What is the probability that a randomly selected business major is a man?

(A) .2979  (B) .3575  (C) .5500  (D) .5909  (E) none of the above

We had a box with 120 fun size bags of Oodles candy. Each of the bags was opened and the number of pieces in fun size bag of Oodles candy was counted. The following data was found:

<table>
<thead>
<tr>
<th>number of pieces of candy in a bag</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>number of bags</td>
<td>5</td>
<td>30</td>
<td>25</td>
<td>18</td>
<td>15</td>
<td>20</td>
<td>7</td>
</tr>
</tbody>
</table>

12. What is the probability there are more than 14 pieces of candy in a snack size bag?

(A) .225  (B) .187  (C) .341  (D) .495  (E) none of the above

13. What is the expected number of pieces of candy in a snack size bag?

(A) 13  (B) 12.8  (C) 17.1  (D) 11  (E) none of the above

14. What is the (median, mode) for the number of pieces of candy in a snack size bag of Oodles?

(A) (13, 16)  (B) (13, 11)  (C) (12.5, 11)  (D) (12.5, 16)  (E) none of the above

15. What is the standard deviation in the number of Oodles in a snack size bag?

(A) 2.000  (B) 2.160  (C) 1.698  (D) 1.691  (E) none of the above
16. You have a batch of 200 night lights. Each night light has an expected life of 1200 hours with a standard deviation of 150 hours. Use Chebychev’s theorem to estimate how many light bulbs will last between 900 and 1500 hours.

(A) 50  (B) 100  (C) 150  (D) not enough data  (E) none of the above

17. At a certain university the probability that an entering freshman will graduate within four years is 55%. From a group of 100 students, what is the expected number of students that will graduate within four years? What is the standard deviation of the number of students that will graduate within four years?

(A) $E = 45, \sigma = 7.4$  (B) $E = 55, \sigma = 7.4$  (C) $E = 55, \sigma = 5$  (D) $E = 45, \sigma = 5$  (E) none of the above

WORK-OUT PROBLEM (15 points)

A bowl has 5 red and 7 green marbles. Four marbles are chosen without replacement from the bowl. Find the probability distribution table for the number of green marbles chosen. Draw the histogram for the probability distribution table. What is the mean and standard deviation for number of green marbles chosen? Show these both on the histogram.

Normal Distribution Problems?

Find $P(Z > 3)$ where $Z$ is the standard normal variable.

Find $P(X < 14)$ where $X$ is a normal variable with mean of 15 and standard deviation of 1.2.

The length of a 6 month old baby boy has a mean of 26.75” with a standard deviation of .875. These lengths follow the normal curve closely. What is the probability that a 6 month old baby boy is longer than 26”? What is the length of a 6 month baby boy who is in the 90th percentile? In a group of 50 6 month old baby boys, how many would you expect to be between 25” and 28” long?

A new Christmas tree farm has planted 1000 pine seedlings. A pine seedling has an 80% chance of surviving its first year. Use the normal curve approximation to the binomial distribution to find the probability that more than 900 seedlings survive their first year.