Let \( S = \{1,2,3,4,5,6\} \), \( A = \{3,4,6\} \), and \( B = \{2,4\} \). Draw a Venn diagram and find the following sets (events).

(a) \( A \cap B \).

(b) \( A \cap B' \).

(c) \( A' \cap B' \).

(d) \( A \cup B' \).

What are the four rules of probability?

(a)

(b)

(c)

(d)

What are the odds for the occurrence of an event if its probability is 0.75?

Convert the 4 to 5 odds into a probability.
5 Given $P(A) = 0.59$, $P(B) = 0.46$, and $P(A \cap B) = 0.38$, draw a Venn diagram, fill in the probabilities associated with the various regions, and thus determine

(a) $P(A' \cap B)$;
(b) $P(A \cup B)$;
(c) $P(A' \cap B')$;
(d) $P(A' \cup B)$.

6 In the following table, 60 college students are classified according to their class standing and also according to their favorite pizza topping:

<table>
<thead>
<tr>
<th></th>
<th>A Anchovies</th>
<th>O Onions</th>
<th>M Mushrooms</th>
<th>H Hamburger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman (F)</td>
<td>7</td>
<td>6</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Sophomore (S)</td>
<td>1</td>
<td>9</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Junior (J)</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>8</td>
</tr>
</tbody>
</table>

If one student is selected at random, find

(a) $P(F \cap A)$;
(b) $P(F \cup A)$;
(c) $P(F \mid A)$. 
7 In a third world country 40% of the population has their own transportation. If a sample of 10 people form this population is selected at random, find the probability that

(a) more than 6 people in the sample have their own transportation;

(b) at most 2 people in the sample have their own transportation;

(c) at least 6 people in the sample have their own transportation.

8 Let the random variable $X$ have a binomial distribution with $n = 10$ and $p = 0.4$. Find

(a) the mean of the distribution;

(b) the variance of the distribution.

9 (a) Find $Z_{0.005}$. **Draw a graph with all the details.**

Answer: $Z_{0.005} = \underline{\hspace{2cm}}$

(a) Find $Z_{0.01}$. **Draw a graph with all the details.**

Answer: $Z_{0.01} = \underline{\hspace{2cm}}$
10. Find the mean, variance and the standard deviation of the following distribution.

<table>
<thead>
<tr>
<th>$x$</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>$f(x)$</td>
<td>0.274</td>
<td>0.491</td>
<td>0.196</td>
<td>0.039</td>
</tr>
</tbody>
</table>

Answers:
Mean: __________________
Variance: ________________
S.D.: __________________

11. Let $Z$ have a standard normal distribution. Find the following:

**Draw graphs with all the details.**

(a) $P(-1.35 < Z < 2.58)$;

(b) $P(1.35 < Z < 2.58)$.
The weights of a large shipment of cast iron bollards are random variables with mean 50.25 pounds and standard deviation 0.63 pounds. What is the probability that a randomly selected bollard from this shipment will weigh

(a) less than 49 pounds;

(b) between 50 to 51 pounds?

13 Sample space is all the possible outcomes of an experiment. (T, F).

14 For any two events $A$ and $B$, $P(A \cup B) = P(A) + P(B)$. (T, F)

15 $\mu$ is the symbol for sample mean. (T, F)

16 Normal curves are symmetric about the mean. (T, F)

17 If $A$ and $B$ are mutually exclusive sets (events), then $A \cap B$ is an empty set (event). (T, F)

18 Area under the standard normal curve is one unit. (T, F)

19 Area under the curve of a normal distribution with mean 10 and standard deviation 2 is equal to one (T,F).