

1. A track and field team of 10 athletes needs to be divided into a group of 4 for relay, a group of 4 for 100-m dash, and a group of two for hurdles. How many different choices can the coach make?

- a. $\frac{10!}{4!4!2!}$ b. $C(10, 4) \cdot C(10, 4) \cdot C(10,2)$ c. $10^4 \cdot 10^4 \cdot 10^2$
 d. $P(10, 4) \cdot P(10, 4) \cdot P(10, 2)$ e. $\frac{10!}{4!4!2!3!}$

2. The following table gives the possible outcomes of an experiment with their respective probabilities. Given the events $E = \{s_1, s_2\}$ and $F = \{s_2, s_3\}$ compute $\Pr((E \leftrightarrow F)')$.

<u>outcome</u>	<u>Probability</u>
s ₁	.2
s ₂	.3
s ₃	.1
s ₄	.4

- a. 0.5 b. .3 c. .6 d. .4 e. .7

3. The odds in favor of the U.S. winning the next soccer world championships are 5 to 95. What is the probability that the U.S. will lose?

- a. .005 b. .95 c. $\frac{1}{19}$ d. $\frac{18}{19}$ e. .9

4. A drawer contains 8 pairs of socks, 5 pairs are blue and 3 pairs are black. A person picks at random two socks out of the drawer. What is the probability that the two socks are of the same color?

- a. $\frac{5}{8}$ b. $\frac{3}{64}$ c. $\frac{37}{60}$ d. $\frac{1}{2}$ e. $\frac{13}{16}$

5. An urn contains 5 red balls and 3 green balls. A sample of 3 balls is selected. What is the probability of having balls of two different colors?

- a. $\frac{90}{336}$ b. $\frac{26}{56}$ c. $\frac{45}{56}$ d. $\frac{11}{56}$ e. $\frac{1}{4}$

6. In a class of 120 people all but 20 will leave during Spring Break. 70 will go to Florida while 90 have purchased a plane ticket to go some where. What is the probability that a randomly chosen student in this class is flying to Florida?

- a. $\frac{7}{12}$ b. $\frac{1}{2}$ c. $\frac{7}{12} \cdot \frac{9}{12}$ d. $\frac{3}{4}$ e. $\frac{1}{6}$

7. Given that $\Pr(E) = .5$, $\Pr(F) = .4$ and $\Pr(E \leftrightarrow F) = .3$, find $\Pr(E \leftrightarrow F')$.

- a. .3 b. .1 c. .2 d. .9 e. .7

8. A die is rolled 3 times. Compute the probability that all three outcomes are even numbers.

- a. $\frac{7}{8}$ b. $\frac{1}{2}$ c. $\frac{1}{24}$ d. $\frac{\binom{6}{3}}{6^3}$ e. $\frac{1}{8}$

9. Given that $\Pr(E) = .3$ and $\Pr(E \leftrightarrow F) = .06$, what is $\Pr(F)$ if E and F are independent events?

- a. .3 b. .02 c. .018 d. .2 e. .06

10. A student signing up for Math 104 has the same probability of being assigned to one of the 3 sections. Of the people in the 8:00 class 96% pass while 97% pass in the 11:15 class and 95% pass in the 1:15 class. What is the probability that a student who failed was in the 11:15 class?

- a. .3 b. .1 c. $\frac{1}{4}$ d. $\frac{2}{5}$ e. $\frac{3}{10}$

11. A fair coin and a coin with two tails are in a box. One of them is randomly selected and tossed twice. What is the probability that the fair coin was selected if both the outcomes are tails?

- a. $\frac{1}{5}$ b. $\frac{1}{4}$ c. $\frac{1}{2}$ d. $\frac{3}{4}$ e. $\frac{1}{8}$

12. The probability of developing chronic bronchitis is .3 among smokers and $\frac{1}{9}$ among non smokers. Knowing that only 10% of the undergraduate population at Notre Dame smoke, what is the probability that an undergraduate with chronic bronchitis smokes?

- a. $\frac{3}{4}$ b. 0.03 c. 0.1 d. $\frac{3}{13}$ e. $\frac{1}{4}$

13. What is the probability that among three people chosen randomly, exactly two are born on the same day of the week?

- a. $\frac{19}{49}$ b. $\frac{18}{49}$ c. $\frac{30}{49}$ d. $\frac{6}{49}$ e. $\frac{42}{49}$

14. A box contains ten light bulbs, 4 bad and 6 good. Two bulbs are selected at random. One of them is tested and found to be good. What is the probability that the other one is also good?

- a. $\frac{\binom{6}{2}}{\binom{10}{2} - \binom{4}{2}}$ b. $\frac{1}{2}$ c. $\frac{\binom{6}{2}}{\binom{10}{2}}$ d. $1 - \frac{\binom{4}{2}}{\binom{10}{2}}$ e. $\frac{5}{9}$

15. A random variable X has the following probability distribution

<u>K</u>	<u>Pr(X=k)</u>
0	.4
2	.4
-2	.2

Find the probability distribution of the variable $(X + 1)^2$

- a.

<u>k</u>	<u>Pr(X = k)</u>
1	0.4
5	0.6
- b.

<u>k</u>	<u>Pr(X = k)</u>
1	.4
9	.6
- c.

<u>k</u>	<u>Pr(X = k)</u>
0	.4
1	.4
-1	.2
- d.

<u>k</u>	<u>Pr(X = k)</u>
1	.6
9	.4
- e.

<u>k</u>	<u>Pr(X = k)</u>
0	.4
1	.6

16. When you print a document from the personal computer in your room, through the network, your document will be printed by one of the printers in one of the 4 clusters. The following table gives you the probability that your document will be printed in a cluster, and the probability that a document printed in this cluster is printed on a laser printer.

<u>Cluster</u>	<u>Prob. Your Document is Printed Here</u>	<u>Prob. of being printed on Laser Printer</u>
1	.1	0.2
2	.6	0.8
3	.2	0.5
4	.1	0.6

What is the probability that your document was printed in cluster 4 if it was printed by a laser printer?

- a. $\frac{3}{20}$ b. 0.06 c. $\frac{1}{10}$ d. $\frac{1}{33}$ e. $\frac{1}{11}$

17. Assume that $\Pr(E) = .2$, $\Pr(F) = .1$ and E and F are mutually exclusive. Are E and F independent?

- a. Yes b. No c. The information given is not enough to decide.

18. A bag contains 6 bad apples and two good ones. Apples are taken out one at a time, without replacement, until a good one is found. What is the probability that the procedure will stop at the third pick?

- a. $\frac{6}{8} \cdot \frac{5}{7} \cdot \frac{2}{8}$ b. $\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2}$ c. $\frac{6}{8} \cdot \frac{6}{8} \cdot \frac{2}{8}$ d. $\frac{6}{8} \cdot \frac{5}{7}$
 e. $\frac{6}{8} \cdot \frac{5}{7} \cdot \frac{2}{6}$

19. A ballroom dance class, that John and Mary attend, has 25 women and 12 men. The instructor selects at random 4 men and 4 women for a competition. What is the probability that John and Mary will be among the people selected?

- a. $\frac{\binom{11}{3} \binom{24}{3}}{\binom{12}{4} \binom{25}{4}}$ b. $1 - \frac{\binom{11}{3} \binom{24}{3}}{\binom{12}{4} \binom{25}{4}}$ c. $\frac{1}{\binom{12}{4} \binom{25}{4}}$
 d. $\frac{\binom{4}{3} \binom{4}{3}}{\binom{12}{4} \binom{25}{4}}$ e. $1 - \frac{1}{\binom{12}{4} \binom{25}{4}}$

20. The weather report says there is a 60% chance of snow tomorrow. If it does not snow tomorrow, then the chances of it snowing on the day after tomorrow are 80%. If it snows tomorrow, there is a 40% chance of snow for the day after. What is the probability that it will snow the day after tomorrow?

- a. .8 b. 1 c. .56 d. .32 e. .24