1. A box contains five blue balls and a green ball. Two balls are selected from the box, one at a time without replacement. If the second ball selected is green, what is the probability the first one was blue?

   (a) 5/6 (b) 1/6 (c) 0 (d) 1 (e) 1/2 (f) none of the others

2. For two events A and B we have $Pr[A] = .29$, $Pr[B] = .43$, and $Pr[A \cup B] = .65$. Find $Pr[A \cap B]$.

   (a) .07 (b) .43 (c) .27 (d) .08 (e) .16 (f) none of the others

3. Nine students apply for a summer job, and 4 will be selected for an interview. How many selections are possible?

   (a) 126 (b) 70 (c) 120 (d) 220 (e) 84 (f) none of the others

4. Professor Keck uses one of two overhead projectors for his lectures. Projector 1 breaks down with probability .8, while projector 2 breaks down with probability .4. On Monday, Keck will choose a projector at random. What is the probability the projector will break?

   (a) .8 (b) .5 (c) .4 (d) .7 (e) .6 (f) none of the others

5. In this problem we use the same setup as in the preceding one. On Tuesday, Professor Keck chooses at random one of the two overhead projectors, and it breaks down. What is the probability he chose projector 1?

   (a) 1/3 (b) 2/3 (c) 1/2 (d) .8 (e) .4 (f) none of the others

6. In a class of 100, there are 60 Seniors and 30 Indiana residents. It is also known that 25 students are neither Indiana residents, nor Seniors. How many Seniors are Indiana residents?

   (a) 15 (b) 20 (c) 25 (d) 30 (e) 35 (f) none of the others

7. For two independent events A, B we have $Pr[A] = 1/3$ and $Pr[B] = 2/5$. Find $Pr[A' \cap B']$.

   (a) 1/10 (b) 2/15 (c) 1/6 (d) 2/5 (e) 9/20 (f) none of the others

8. The bridge club has 4 sophomores and 5 freshmen. Four of these are selected at random to form a tournament team. Find the probability that at least one member of each class will be included in the team.

   (a) 1 (b) $\frac{4}{5}$ (c) $\frac{1}{2}$ (d) $\frac{20}{C(9,4)}$ (e) $\frac{120}{C(9,4)}$ (f) none of the others

9. A sample space consists of three outcomes a, b, c. We know that $Pr[a] = 1/3$ and b is three times as likely as c. Find $Pr[b]$.

   (a) 1/6 (b) 1/3 (c) 1/2 (d) 2/3 (e) 5/6 (f) none of the others

10. Consider the following experiment. A coin is tossed repeatedly, and the outcome (H or T) of each toss is recorded. The experiment stops if there are two consecutive tosses with the same outcome (examples: TT, THH) or if the coin was tossed three times (example:THT). How many possible outcomes are there for this experiment?

    (a) 4 (b) 6 (c) 8 (d) 10 (e) 16 (f) none of the others

11. Five students A,B,C,D,E are lined up to buy tickets at the Finite Arts Theater. In how many ways can they be arranged if B and C are next to each other?

    (a) 24 (b) 48 (c) 60 (d) 72 (e) 96 (f) none of the others

12. A box contains 3 green balls and 9 blue balls. Two balls are selected at random one after another without replacement. What is the probability that the second one is blue?

(a) 1/4 (b) 1/3 (c) 1/2 (d) 2/3 (e) 3/4 (f) none of the others

13. For a random variable X it is known that $Pr[X = 0] = .4$, $Pr[X = 1] = .3$, $Pr[X = 2] = .2$, and $Pr[X = 10] = .1$. Find the expected value of X.

    (a) .3 (b) 1.2 (c) 1.5 (d) 1.7 (e) 2.7 (f) none of the others

14. A box contains 4 red balls and 3 blue balls. Four balls are selected simultaneously at random and their colors are noted. A random variable X is defined to be the number of red balls minus the number of blue balls. Find $Pr[X = 2]$.

    (a) 4/35 (b) 1/7 (c) 2/5 (d) 12/35 (e) 4/7 (f) none of the others

15. A Bernoulli trial with success probability $p = .2$ is repeated independently seven times. Find the probability that at least one of the seven tries is a success.

    (a) $1 - (.2)^7$ (b) $1 - (.8)^7$ (c) $7(.2)(.8)^6$ (d) $7(.2)^6(.8)$ (e) $C(7,1)(.2)^6$ (f) none of the others

16. A student has five nickels and four quarters in her pocket. She picks two coins at random. What is the expected total value in cents of the coins?

    (a) 125/9 (b) 250/9 (c) 30 (d) 25/2 (e) 15 (f) none of the others

17. A complete dinner at the Infinite Math Restaurant consists of an appetizer, a main course, and a desert. There are five appetizers, six main courses, and three desserts to choose from. How many different dinners can be ordered at this restaurant?

    (a) 14 (b) 90 (c) 17 (d) C(14,3) (e) P(14,3) (f) none of the others

18. There are 2 white balls and 3 red balls in a jar. A ball is selected at random, its color is noted, and it is replaced. Repeat this selection two more times. Find the probability that one red and two white balls are selected.

    (a) $3 \cdot \frac{2}{5} \cdot \left(\frac{3}{5}\right)^2$ (b) $\frac{2}{5} \cdot \left(\frac{3}{5}\right)^2$ (c) $\left(\frac{2}{3}\right)^2 \cdot \frac{1}{3}$ (d) $3 \cdot \left(\frac{2}{5}\right)^2 \cdot \frac{3}{5}$ (e) $\left(\frac{2}{5}\right)^3$ (f) none of the others

19. Jack wants to buy a two-scoop sundae at Baskin-Robbins. How many choices of flavor combinations does he have if he is allowed to choose the same flavor twice? Recall that there are 31 flavors in all! (Chocolate and Vanilla is the same as Vanilla and Chocolate.)

    (a) $P(31,2)$ (b) $C(31,2)$ (c) $C(31,2) + 31$ (d) $P(31,2) + 31$ (e) 31^2 (f) none of the others

20. For two events A and B we are given that $Pr[A] = 1/3$, $Pr[B|A] = 1/2$, and $Pr[B|A'] = 1/5$. Find $Pr[B]$.

    (a) 3/10 (b) 7/10 (c) 7/20 (d) 1/2 (e) 2/5 (f) none of the others

21. At a gathering of 10 people, each participant must shake each other participant's hand once. How many handshakes must there be?

    (a) 90 (b) 45 (c) 100 (d) 2^{10} (e) 10! (f) none of the others

22. Which formula gives the probability of a "one" occuring exactly 4 times in 10 throws of a fair die?

    (a) $C(6,1)\left(\frac{1}{6}\right)^4\left(\frac{5}{6}\right)^6$ (b) $C(6,1)\left(\frac{1}{6}\right)^6\left(\frac{5}{6}\right)^4$ (c) $C(6,4)\left(\frac{1}{6}\right)^4\left(\frac{5}{6}\right)^6$

    (d) $C(10,4)\left(\frac{1}{6}\right)^6\left(\frac{5}{6}\right)^4$ (e) $C(10,4)\left(\frac{1}{6}\right)^4\left(\frac{5}{6}\right)^6$ (f) none of the others

23. Archer A has a success rate of 70% and archer B has a success rate of 60%. An experiment consists in having A try once to hit a balloon. If A fails then B also has one try.

(23.1) What is the probability that neither archer hits the target?

(a) .12 (b) .18 (c) .3 (d) .4 (e) .7 (f) none of the others

(23.2) If the target is hit, what is the probability that it was hit by A?

(a) .7 (b) .35 (c) 35/44 (d) 35/41 (e) .6 (f) none of the others

24. A student takes a True—False test on which there are 12 questions. He picks his answer to each question at random. What is the probability that all his answers are wrong?

(a) 1/2 (b) $\frac{1}{P(12,12)}$ (c) 0 (d) $\left(\frac{1}{2}\right)^{12}$ (e) $\frac{12}{2^{12}}$ (f) none of the others