

Homework Answers: #1 - 5, ~~8~~, ~~10~~, 15

1. Meal deal. Choice B. $3 \times 5 \times 4 = 60$.

2. Permutation? Choice C.

3. Combination? Choice D.

4. Robotics team. Choice D.

$$\frac{{}_6C_2 \cdot {}_4C_2}{{}_{10}C_4} = \frac{15 \times 6}{210} \approx 0.43$$

5. How much bigger? Choice B.

$${}_{13}P_{10} = 1,037,836,514 \text{ and } {}_{13}C_{10} = 286. 1,037,836,514 / 286 = 3,628,800$$

~~8~~ Roulette.

If a roulette wheel is to be considered truly random, then each outcome is equally likely to occur, and knowing one outcome will not affect the probability of the next. Additionally, there is an implication that the outcome is not determined through the use of an electronic random number generator.

~~13~~ Survival.

This estimate is based on the long run (so far) experience (data) for similar patients.

15. Fouls.

The team should foul the player with the lowest season-long foul-shooting percentage. The long-run proportion of success is the best predictor of players' abilities.

Classwork - Textbook #6, 13, 18, 22, 24

6. **Sample spaces** For each of the following, list the sample space and tell whether you think the events are equally likely:

- Draw a card from a well-shuffled deck; record the suit.
- Roll two dice; record the larger number.
- Toss 2 coins; record the order of heads and tails.
- Flip a coin until you get a head or 3 consecutive tails; record each flip.

a) $\{ \text{Hearts, Diamond, Club, Spade} \}$ equally likely

b) $\{ 6, 5, 4, 3, 2, 1 \}$ not equally likely
(1,1) (1,2) (1,3) ...

c) $\{ (H,H), (H,T), (T,H), (T,T) \}$ equally likely

d) $\{ H, TH, TTH, TTT \}$ not equally likely
 $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{8}$

13. **Snow** After an unusually dry autumn, a radio announcer is heard to say, "Watch out! We'll pay for these sunny days later on this winter." Explain what he's trying to say, and comment on the validity of his reasoning.

He's referring to the Law of Averages, which is not true.

Weather does not compensate for short-run changes from normal.

18. **Literature** Your American Lit class will read 4 novels this year, chosen by class vote from a list of 12 possible books offered by the teacher.

- a) How many different ways could the course unfold, given that it probably matters what order you read the books in.
- b) How many different choices of books could the class make?

$$a) {}_{12}P_4 = 11,880 \qquad b) {}_{12}C_4 = 495$$

22. **Dice product** You are playing a game that involves rolling two dice, but instead of using the sum, you'll get paid in tokens equal to the *product* of the numbers you roll. (For example, if you roll a 3 and a 4, you win 12 tokens.)
- a) Create a sample space for the number of tokens you may win. Be careful to do this in a way that makes all the outcomes you list equally likely.
 - b) What's the probability you win an odd number of tokens?

24. **Poker** You're playing poker with some friends, and are about to be dealt 5 cards from a well-shuffled standard deck.

- a) How many different hands are possible? $52C_5 = 2,598,960$
b) How many hands contain only hearts? $13C_5 = 1287$
c) What's the probability you'll be dealt a flush (5 cards all the same suit)?

$$\begin{array}{r} P(5H \text{ or } 5D \text{ or } 5S \text{ or } 5C) \\ 1287 + 1287 + 1287 + 1287 \\ \hline 2,598,960 \end{array} = \frac{5148}{2,598,960}$$

Homework: #7, 9, ~~14~~, 19, 20, 21
Pg. 305-306 in Book