$$\frac{A}{A+B}$$

$$\frac{\theta}{\theta+1}$$

$$a_1p_1 + a_2p_2 + \ldots + a_kp_k$$

1) A random outcome is unpredictable in the short run, but has a regular, predictable pattern in the long run.

TRUE **Definition of a random outcome from notes.**

2) If you toss a coin 10,000 times to determine if it is fair, what type of probability are you using?

Empirical **You are actually observing empirical data and counting the number of times the outcome appears out of the total number of outcomes.**

3) Identify the legitimate assignment of probabilities for a sample space with 4 outcomes

0.2, 0.2, 0.2, 0.4 **Must all be between 0 and 1 and add to 1.**

A psychologist gives subjects a set of puzzles and measures how many are completed in 5 minutes. From data from many subjects, the psychologist establishes the following probability model:

Puzzles solved	1	2	3	4	5
Probability	?	0.50	0.20	0.10	0.10

4) What is the probability that a subject will complete only one puzzle?

0.10 The probabilities have to add to 1

5) What is the complement of completing 3 or fewer puzzles?

more than 3 puzzles The complement if an event is the opposite events (all the other outcomes). "3 or fewer" includes 1,2, or 3. Then the complement is 4 or 5. "more than 3 puzzles" means the same thing as 4 or 5 puzzles.

6) If you flip a fair coin 5 times and get 5 heads in a row, what is the probability that you will get a head on the 6th flip?

0.50 **coin flips are independent so the probability of a heads on any flip is 0.5**

A store hands out scratch-off tickets with cash prizes printed on them (probability model is table at right).

Outcome	$0	$5	$100
Probability	0.95	0.04	0.01

7) What is the expected winning for a customer?

$0(0.95) + 5(0.04) + 100(0.01) = \$1.20$ **just take each outcome times the probability and add. We do not need to subtract anything since the tickets were handed out free**

8) What is the probability that a customer entering the store will not win one of the cash awards?

0.95 **Not winning anything is the same as winning $0. This happens 95% of the time.**

9) If several thousand customers average their winnings, we can expect their average winnings to be close to the expected value **Law of Large Numbers**

10) Two events are independent if

The occurrence of one event does not affect the occurrence of the other event

11) TRUE or FALSE For a certain car, the events "car wins the race" and "car loses the race" would be considered disjoint

TRUE **cannot both happen, so disjoint**

12) Suppose the odds for passing a class are 10 to 1. Find the probability of passing the class.

10/11 **10 passes for every 11 classes**

13) Find the probability (using a fair six-sided die) of rolling a "1" on the first roll AND rolling a "1" on the second roll.

(1/6)(1/6) = 1/36 **dice rolls are independent. The word "AND" tells you to multiply. The probability of rolling a "1" on a single roll is 1/6 each time, so multiply.**

14) The Law of Large Numbers says that for a random sample, the sample mean will

be equal to the population mean with a large enough sample size

15) What is true about the sampling distribution of the sample proportion?

It has a normal distribution as long as the sample size is large

A survey is being conducted using a random sample of 120 economists, asking whether paying off debt is the best usage of federal stimulus funds by the state. Of those, 33 think it is the best usage of the funds. The true percentage of all economists thinking it is the best usage is 40%.

16) Find the sample proportion, $\hat{p}$, of those that think paying off debt is the best use of funds.

$\frac{33}{120} = 27.5\%$

17) Find the mean of the distribution of the (all possible) sample proportions for those that think paying off debt is the best use of funds.

40% **The mean of the normal distribution that describes all possible p-hats is the population proportion, p.**

18) Find the standard deviation of the distribution of (all possible) sample proportions for those that think paying off debt is the best use of funds.

$\sqrt{\frac{0.4(1-0.4)}{120}} = \sqrt{\frac{p(1-p)}{n}}$

19) The variability in the distribution for (all possible) $\hat{p}$'s will _____ if we consider a larger sample size

get smaller **bigger sample size, smaller variability**

Wing lengths (inches) were measured from fledglings at an avian nesting site. A 90% confidence interval used to estimate the mean wing length is (2.163, 3.434).

20) Choose the correct interpretation.

We are 90% confident that true mean wing length in all fledglings like these is at least 2.163 inches and at most 3.434 inches. **Must use the word "confident" and not talk about the sample**