

1. Determine which approach to calculating probability is used (subjective, classical, relative frequency).

a. The probability of drawing a spade from a pack of 52 well-shuffled playing cards is $13/52 = \frac{1}{4}$.

b. A businessman thinks that the probability that the economy will improve by the end of the year is 30%.

c. The probability that someone will be struck by lightning is $1/727,000$.

2. A coin is flipped three times.

a. Create the sample space of possible outcomes (heads/tails).

b. What is the probability of getting three heads in a row?

3. A manufacturing process produces 12 defective parts and 88 good parts.

a. Find the probability of getting two good parts when two parts are randomly selected if the first selection is replaced before the second is made.

b. Find the probability of getting two good parts when two parts are randomly selected if the first selection is *not* replaced before the second is made.

4. Use the following table for parts a-g which summarizes successes and failures when subjects used different methods in trying to stop smoking. The determination of smoking or not smoking was made five months after the treatment was begun, and the data are based on results from the Centers for Disease Control Prevention.

	Nicotine Gum	Nicotine Patch	Nicotine Inhaler	Total
Smoking	109	263	95	467
Not smoking	59	57	27	143
Total	168	320	122	610

a. If an individual is randomly selected from this group, what is the probability that he/she stopped smoking?

b. If an individual is randomly selected from this group, what is the probability that he/she stopped smoking, given that the nicotine patch was used?

c. Are the events of stopping smoking and using the nicotine patch independent? Justify your answer using probabilities.

d. Are the events of stopping smoking and using the nicotine patch mutually exclusive? Justify your answer using probabilities.

e. If an individual is randomly selected from this group, what is the probability that the nicotine patch or the nicotine inhaler was used? Are these events mutually exclusive? Justify your answer using probabilities.

f. If an individual is randomly selected from this group, what is the probability that he/she stopped smoking or used the nicotine patch?

g. If two individuals are randomly selected from the group, what is the probability that they both continued smoking?

5. Is the following a probability distribution? Why or why not?

X	P(X)
1	-.05
2	.65
3	.20
4	.20

6. Find the mean of the following probability distribution.

X	P(X)	
10	.20	
20	.30	
30	.50	

7. In clinical trials of a new allergy medication, 30% of patients in the study experienced insomnia as a side effect. Suppose four participants in the study are randomly selected. Let X = the number in the sample experiencing insomnia as a side effect.

a. Is X a discrete or continuous random variable?

b. What is the probability distribution for X ?

X					
P(X)					

c. What is the probability that exactly 2 experienced side effects? Use the binomial formula and check your answer with the table above.

d. What is the probability that 2 or fewer experienced side effects?

e. What is the expected number experiencing insomnia as a side effect in this sample?

f. What is the standard deviation for the number experiencing insomnia as a side effect in this sample?

8. An insurance policy costs \$100 and will pay policyholders \$10,000 if they suffer a major injury (resulting in hospitalization) or \$3000 if they suffer a minor injury (resulting in lost time from work). The company estimates that each year 1 in every 2000 policyholders may have a major injury and 1 in 500 a minor injury. What is the expected payout for an individual who purchases a policy?

9. A consumer organization inspecting new cars found that many had appearance defects (dents, scratches, paint chips, etc.) While none had more than three of these defects, 7% had three, 11% had two, and 21% had one. Find the expected number of appearance defects in a new car.

10. A man buys a racehorse for \$20,000. He plans to enter it in a race and then sell it afterwards. He believes that there is a 20% chance that the horse will win the race and he will be able to sell it for \$50,000. If the horse loses, he believes that it will be worth only \$8,000. What is his expected profit?

11. Two thousand tickets are sold for a raffle. The grand prize is \$500, the second prize is \$100, and there are ten \$10 prizes. If tickets cost \$2 each, what is your expected profit for the game if an individual buys one ticket?