Conditional Probability (Sec 8.5)

1) A jar contains 5 red marbles and 4 green marbles. You are going to pick 2 marbles, one at a time. Find the probability that the 1st marble is green and the 2nd marble is green if:

a) the 1st marble is replaced before selecting the 2nd.

b) the 1st marble is not replaced before picking the 2nd marble.

*Conditional Probability

$$P(A \cap B) = \underline{\qquad} \ \underline{\qquad}$$

which gives: $P(B/A) = \underline{\qquad}$ or $P(A/B) = \underline{\qquad}$

2) Two fair dice, one red and one green, are rolled. Find the probability that:

a) the red one is 5 given that the sum is 6.

b) the sum is 7 given that the dice have opposite parity (one die is even, the other odd).

47. Personal Bankruptcy In 2020, the probability that a person in the United States would declare personal bankruptcy was .0016 . The probability that a person in the United States would declare personal bankruptcy and had recently experienced medical-related issues was .0011 . ✱ What was the probability that a person had recently experienced medical-related issues, given that they had declared personal bankruptcy? (Round your answer to two decimal places.)

51. Road Safety: PDO Crashes In 2019, of motor vehicle crashes with property damage only (PDO crashes), 8.6% involved speeding. Of the crashes involving speeding, 23% involved a young driver (between the ages of 15 and 20). ✱ What was the probability that a crash involved a young driver speeding? (Round your answer to two significant digits.) [**Hint:** See Example 1.]

Education and Employment Exercises 73, 74, 75, 76, 77, 78, 79, 80, 81, *and* 82 *are based on the following table, which shows U.S. employment figures for 2020, broken down by educational attainment.* ✱ *All numbers are in millions and represent civilians aged 25 years and over. Those classed as "not in labor force" were not employed nor actively seeking employment. Round all answers to two decimal places.*

	Employed	Unemployed	Not in Labor Force	Total
Less Than High School Diploma	7.9	1.0	11.0	19.9
High School Diploma Only	31.6	3.1	27.4	62.1
Some College or Associate's Degree	33.6	2.8	20.9	57.3
Bachelor's Degree or Higher	57.5	2.9	23.0	83.5
Total	130.6	9.8	82.3	222.8

73. Find the probability that a person was employed, given that the person had a bachelor's degree or higher.

74. Find the probability that a person was employed, given that the person had attained less than a high school diploma.

75. Find the probability that a person had a bachelor's degree or higher, given that the person was employed.

*Knowing whether 2 events are independent or dependent is an important idea!

ex. Flip a fair coin twice. Let A = the event of getting a head on the 1st flip, and B = the event of getting a head on the 2nd flip.

Find $P(A \cap B)$

*Note, in this case, the $P(B/A)$ = _____ , so A's occurrence had _____ effect on B's.
When this happens, we say that the events A and B are _____ .

Two events A and B are _____ if:

1) $P(B/A)$ = _____

2) $P(A/B)$ = _____

3) $P(A \cap B)$ = _____

ex. Two fair dice, one red and one green, are rolled. Test the following pair of events for independence.

39. A : The red die is 1 , 2 , or 3 ; B : The green die is even.

41. A : Exactly one die is 1 ; B : The sum is even.

43. A : Neither die is 1 ; B : Exactly one die is 2 .

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45. If a coin is tossed 11 times, find the probability of the sequence H, T, T, H, H, H, T, H, H, T, T. [**Hint:** See Example 4.]

57. **Marketing** A market survey shows that 40% of the population used Brand X laundry detergent last year, 5% of the population gave up doing its laundry last year, and 4% of the population used Brand X and then gave up doing laundry last year. Are the events of using Brand X and giving up doing laundry independent? Is a user of Brand X detergent more or less likely to give up doing laundry than a randomly chosen person?

95. ▼ **Drug Tests** If 90% of the athletes who test positive for steroids in fact use them, and 10% of all athletes use steroids and test positive, what percentage of athletes test positive?