## Probability Worksheet

## Day 1

## Introduction

These initial problems will help get us oriented in a context that is more familiar. In each, we will be referring to a standard "die" (singular of dice) that has 6 faces, each with an equal chance of being rolled

**Part A** What is the chance of getting a 1 when rolling a die once?

**Part B** When rolling a die once, what is the chance of rolling a 1 or a 2?

Part C When rolling a die once, what is the chance of rolling a 1 and a 2?

**Part D** What is the chance of rolling a 1,2,3,4,5, or 6?

**Part E** What is the chance of *not* rolling a 2?

## Problem 1 (Addition Rule)

Question 1 Here, we concern ourselves with 10,000 individuals who either (1) rent their home (3,858), (2) have a mortgage on their home (4,789), or (3) own it outright (1,353).

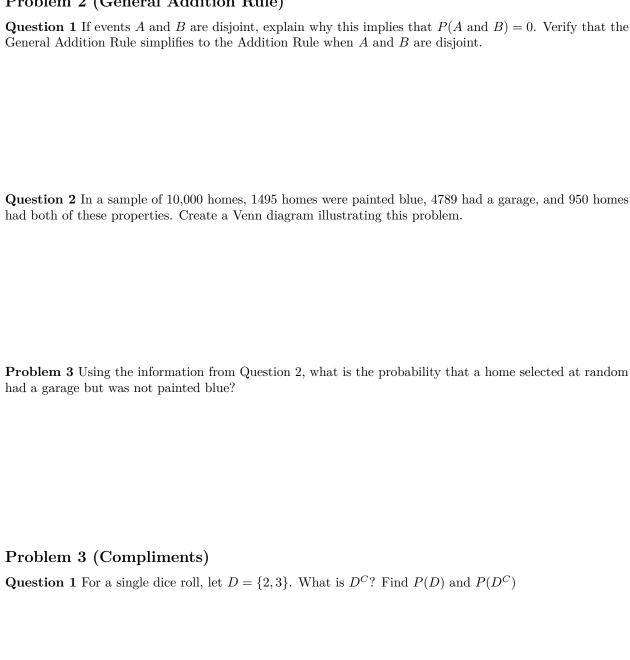
- What proportion of individuals have either a mortgage or own it outright?
- If we select one person out of this 10,000 at random, what is the probability that this person either owns their own or has a mortgage?

Question 2 Consider rolling a dice where we define three different events:

$$A = \{1, 2\}, \quad B = \{4, 6\}, \quad D = \{2, 3\}$$

- What is the probability of event A?
- Are events B and D disjoint? Confirm the addition rule by finding the probability that either B or D occurs.

Problem 2	(General Addition	Rule	)
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Below is a table showing the probability of finding a sum after rolling two dice

Dice Sum	2	3	4	5	6	7	8	9	10	11	12
Probability	$\frac{1}{36}$	$\frac{2}{36}$	$\frac{3}{36}$	$\frac{4}{36}$	$\frac{5}{36}$	$\frac{6}{36}$	$\frac{5}{36}$	$\frac{4}{36}$	$\frac{3}{36}$	$\frac{2}{36}$	$\frac{1}{36}$

Question 2 Let A represent the event in which we roll two dice and their total is less than 12. What does  $A^C$  represent?

 ${\bf Question}~{\bf 3}$  Find the following probabilities from rolling two dice:

- The sum of the dice is not 6
- The sum is at least 4
- The sum is not more than 10