

# Math 20: Probability

## Homework 1 Solution

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There is no standard answer to a problem and the answers here are for reference only.

### Problem 1

5 pts

Give a real life example of an event that happens with probability

- (a)  $P(E) = 0$  (impossible)

**There are 29 days in February 2021.**

- (b)  $P(E) < \frac{1}{2}$  (unlikely)

**A single ticket sold in Hanover matches all six numbers in Wednesday night's drawing, nabbing the jackpot.**

- (c)  $P(E) = \frac{1}{2}$  (even chance)

**The sex of a baby is a boy (girl).**

- (d)  $P(E) > \frac{1}{2}$  (likely)

**A randomly chosen student in Math 20 attended the live session class on June 26.**

- (e)  $P(E) = 1$  (certain)

**It's going to snow this winter in Hanover.**

## Problem 2

4 pts

Chapter 1.2 Exercise 1

Given that  $\Omega = \{a, b, c\}$ , the 8 subsets of  $\Omega$  are

- $\emptyset$
- $\{a\}, \{b\}, \{c\}$
- $\{a, b\}, \{a, c\}, \{b, c\}$
- $\{a, b, c\}$

The corresponding probabilities are

- 0
- $\frac{1}{2}, \frac{1}{3}, \frac{1}{6}$
- $\frac{1}{2} + \frac{1}{3} = \frac{5}{6}, \frac{1}{2} + \frac{1}{6} = \frac{2}{3}, \frac{1}{3} + \frac{1}{6} = \frac{1}{2}$
- 1

## Problem 3

5 pts

Chapter 1.2 Exercise 2

- (a)  $\{A, B\}$
- (b)  $\{\text{Head}, \text{Tail}\}$
- (c)  $\{\text{month}, \text{day} \mid \text{for month} \in S_m, \text{day} \in S_d\}$ , where

$S_m = \{\text{January}, \text{February}, \text{March}, \text{April}, \text{May}, \text{June},$

$\text{July}, \text{August}, \text{September}, \text{October}, \text{November}, \text{December}\}$

and

$S_d = \{\text{Monday}, \text{Tuesday}, \text{Wednesday}, \text{Thursday}, \text{Friday}, \text{Saturday}, \text{Sunday}\}.$

- (d)  $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}.$
- (e)  $\{A+, A, A-, B+, B, B-, C+, C, C-\}.$

### Problem 4

4 pts

Chapter 1.2 Exercise 4

- (a) The first toss is Head.
- (b) The three tosses yield the same face.
- (c) We get two Heads in the three tosses.
- (d) We get at least one Tail in the three tosses.