Math 20: Probability

Homework 1 Solution

June 28, 2020

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 Ω 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) $\{\text{month}, \text{day} | \text{for month} \in S_m, \text{day} \in S_d\}$, 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.