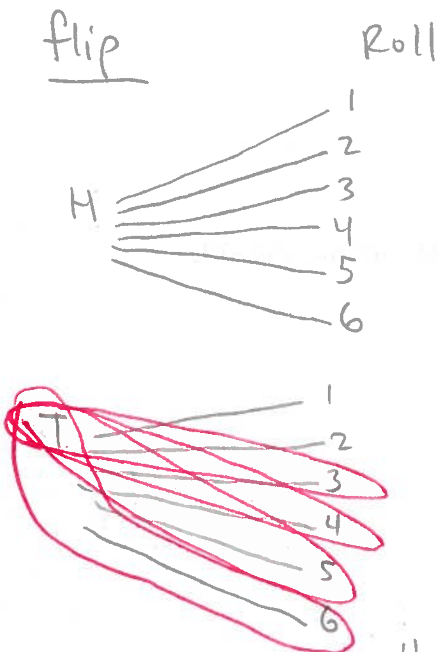
Homework 4 MATH 1550 Fall 2019

§3.2 #20

probability experiment: flip a coin and roll a die

Sample space contains 12 outcomes:



$P(\underline{\text{flip tails then roll a number} > 2}) = \frac{4}{12} = \frac{1}{3}$

#24) Given: 150 out of 1000 in survey responded "very confident".

a) $P(\text{all 4 "very confident"}) = \underset{\uparrow \text{ 1st person}}{\frac{150}{1000}} \cdot \underset{\uparrow \text{ 2nd}}{\frac{149}{999}} \cdot \underset{\uparrow \text{ 3rd}}{\frac{148}{998}} \cdot \underset{\uparrow \text{ 4th}}{\frac{147}{997}} \approx 0.000489$

b) $P(\text{none "very confident"}) = \underset{\uparrow \text{ 1st}}{\frac{850}{1000}} \cdot \underset{\uparrow \text{ 2nd}}{\frac{849}{999}} \cdot \underset{\uparrow \text{ 3rd}}{\frac{848}{998}} \cdot \underset{\uparrow \text{ 4th}}{\frac{847}{997}} \approx 0.5214$

since 150 of 1000 responded "very confident", 850 of 1000 did not!

c) $P(\underbrace{\text{at least one "very confident"}}) = 1 - P(\text{none are "very confident"})$

this event is the "opposite" of the event in part (b), so we may use the formula for the complement of an event — see p.138 of the book

(part (b))

$= 1 - 0.5214$

$= 0.4786$

§3.3 #14

Given: total attendance 4950

of the total, 2110 are profs and 2575 are female

of the profs, 960 are female

Find: P(female OR prof)

Soln: First define events:

E_1 = is college prof, E_2 = is female

Then the given info is

$$P(E_1) = \frac{2110}{4950} \approx 0.4262$$

$$P(E_2) = \frac{2575}{4950} \approx 0.5202$$

$$P(E_2 \mid E_1) = \frac{960}{2110} \approx 0.4549$$

So using addition rule,

$$P(E_2 \text{ OR } E_1) = P(E_2) + P(E_1) - P(E_2 \text{ AND } E_1)$$

$$\overset{\text{mult. rule}}{=} P(E_2) + P(E_1) - P(E_1)P(E_2 \mid E_1)$$

$$= 0.5202 + 0.4262 - (0.4262)(0.4549)$$

$$\approx 0.7525$$

#15) Given: $P(\text{puncture}) = 0.05$

$P(\text{smashed}) = 0.08$

$P(\text{puncture AND smashed}) = 0.004$

Find: $P(\text{puncture OR smashed})$

Soln: By addition rule,

$$P(\text{puncture OR smashed}) = P(\text{puncture}) + P(\text{smashed}) - P(\text{puncture AND smash})$$
$$= 0.05 + 0.08 - 0.004$$
$$= 0.126$$

§4.1

#20) Probability distribution:

total count # employees: 192

x	$P(x)$
0	6/192
1	12/192
2	29/192
3	57/192
4	42/192
5	30/192
6	16/192

graph ⟶ use software!

#21) We solved #19 on 13 September — see the spreadsheet on the website for the distribution.

a) $P(1 \text{ or } 2) = P(1) + P(2) = 0.17 + 0.28$

$= 0.45$

mut. excl.

b) $P(2 \text{ or more}) = P(2) + P(3) = 0.28 + 0.54$

$= 0.82$

c) $P(\text{btwn } 1 \text{ and } 3) = P(1) + P(2) + P(3) = 0.17 + 0.28 + 0.54$

$= 0.99$

#29) a) $\text{mean} = \sum x P(x) = 0(0.686) + 1(0.195) + 2(0.077) + 3(0.022) + 4(0.013) + 5(0.007)$

≈ 0.502

$\text{Var} = \sum (x-\mu)^2 P(x) = (0 - 0.502)^2(0.686) + (1 - 0.502)^2(0.195) + (2 - 0.502)^2(0.077) + (3 - 0.502)^2(0.022) + (4 - 0.502)^2(0.013) + (5 - 0.502)^2(0.007)$

≈ 0.8319

$\text{Stdev} = \sqrt{\text{Var}} \approx \sqrt{0.8319} \approx 0.91213$