Problem 2 – 1(1.1, 1.2), 2(2.1, 2.2), 3, 4(4.1-4.3), 5

1) leader, innovative, determined, logical, empathetic, dreamer, analytical

Event A) admits innovative and analytical only iff inn. before ana. or
Event B) empathetic && inn.

1.1) choose 3 out of 7, what is probability of being admitted

total space = $\binom{7}{3} = 210$

5 · 3

$\frac{30 + 15 - 3}{210} = \frac{42}{210}$ (repeats)

Event A) 1) I I S
2) A S I = 15
3) S A A

Event B) 1) E E S 1) I I S
2) I S E + 2) E S I
3) S I I 3) S E E
15 + 15

2) Consider 4 sequential flips of a fair coin

2.1) A = 2 flips both heads  B = first or last is tails

are A and B independent?

$$P(A) = \frac{8}{16} = \frac{1}{2}$$

$$P(B) = \frac{12}{16} = \frac{3}{4}$$

$$P(A) \cdot P(B) = \frac{3}{8}$$

$$P(A) \cap P(B) = \frac{5}{16}$$

$\frac{3}{8} \neq \frac{5}{16} \Rightarrow$ A and B are not independent

HHHH
HHHT
HHTH
HTHH
THHH
TTHH
THTH
THHT
HTTH

TTTT
TTTH
TTHT
HTTT
HTHT
HHTT

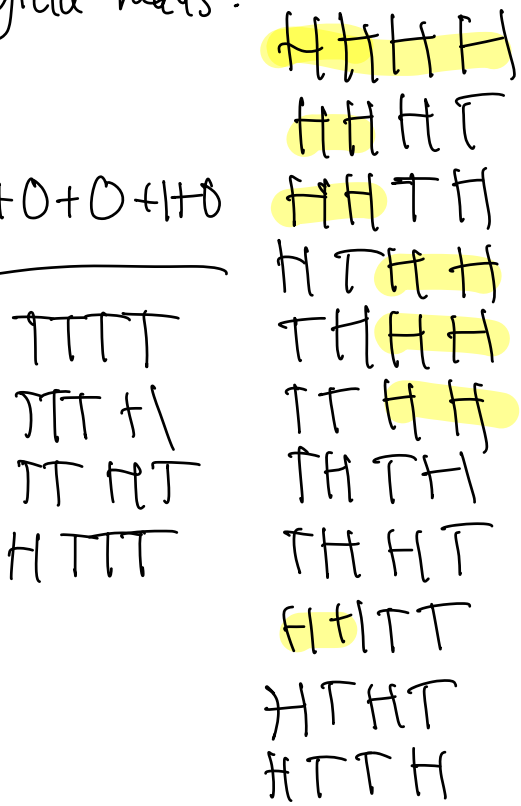
2.2) Pair of 4 flips yield heads?

$E(X) = ?$

$3+2+1+1+1+0+0+0+0+0+1+0+1+0+0$

$16$

$\frac{12}{16} = \frac{3}{4}$



3) Wordle

Nasty

Hasty

Board

Hoard

Mains

Chasing between Nasty and Hasty

| Hasty | Nasty |
|---|---|
| $2 \times \frac{1}{5} = \frac{2}{5}$ | $1 \times \frac{1}{5} = \frac{1}{5}$ |
| $1 \times \frac{1}{5} = \frac{1}{5}$ | $2 \times \frac{1}{5} = \frac{2}{5}$ |
| $2 \times \frac{1}{5} = \frac{2}{5}$ | $2 \times \frac{1}{5} = \frac{2}{5}$ |
| $2 \times \frac{1}{5} = \frac{2}{5}$ | $3 \times \frac{1}{5} = \frac{3}{5}$ |
| $2 \times \frac{1}{5} = \frac{2}{5}$ | $2 \times \frac{1}{5} = \frac{2}{5}$ |
| + | + |
| 9/5 | 10/5 |

Hasty = 1.8 moves

Nasty = 2 moves

4) 6 ft, red hair, green eyes

$\frac{100}{100000}$ are ↑

4.1) suspect is innocent?

$P(\text{innocent} \mid \text{match}) = \frac{\frac{99}{10000}}{\frac{100}{10000}} = 99$

4.2) $P(\text{match} \mid \text{innocent})$

$\frac{\frac{99}{100000}}{\frac{99,999}{100000}} = .00099$

4.3) 1000 potential, prob at least one matches description?

use $1 - \tilde{E}$

$1 - \left(\frac{\binom{99,999}{1000}}{\binom{100,000}{1000}}\right)$ ← innocent don't match; ← images out of population

5) 2 planets . 3

3 planets . 7

5) $P(2 \text{ GIR} \mid 2 \text{ GIR}_{\text{observed}}) = \frac{P(2 \text{ GIR} \mid 2 \text{ GIR}_{\text{observed}})}{P(2 \text{ GIR})_{\text{observed}}}$

redelsopp hint

2 exoplanets orbiting it? How likely earth-type

$P(3 \text{ planets}) \cdot P(\text{observed}) \cdot P(\text{not rocky})$

$0.6 \cdot 0.5^3 \cdot \frac{3}{2}$

$\frac{0.21}{0.285}$

↓

73.68%

↓

0.7368

$P(2 \text{ planets}) \cdot P(2 \text{ gas})$

$0.3 \quad \binom{2}{2}(0.5)^2$

$= 0.75$

$.75 = 0.285$