DSE 210 Worksheet 2

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1a. $\Omega = \{A, B\}$ $|\Omega| = 2$ b. $\Omega = \{H, T\}$ $|\Omega| = 2$ c. $\Omega = \{Jan, Feb, \ldots\} \times \{Mon, Tues, \ldots\}$
$= \{(Jan, Mon), (Jan, Tues), \ldots\}$ $|\Omega| = 84$

d. $\Omega = \{s_1, s_2, \ldots, s_{10}\}$ $|\Omega| = 10$ e. $\Omega = \{ex_{red}, ex_{green} \ldots\} \times \{int_{black}, int_{beige} \ldots\}$
$= \{(ex_{red}, int_{black}), (ex_{red}, int_{beige}) \ldots\}$ $|\Omega| = 8$

3a. $A \cap B \cap C$ b. $A \cup B \cup C$ c. $(A \cap B) \cap C^c$

5 fair coin 3x in succesion $\Omega = \{H, T\}^3$ $|\Omega| = 2^3 = 8$

a. 1^{st} tossed coin is Heads $Pr(E_1) = \frac{|E_1|}{|\Omega|} = \frac{4}{8} = \frac{1}{2}$

b. all Heads or Tails $Pr(E_2) = \frac{|E_2|}{|\Omega|} = \frac{2}{8} = \frac{1}{4}$

c. tails at least once $Pr(E_3) = \frac{|E_3|}{|\Omega|} = \frac{3}{8}$

7. $|\Omega| = 6^2 = 36$ $A = \{(1,1), (2,2), \ldots, (6,6)\}$ $|A| = 6$ $Pr(A) = \frac{|A|}{|\Omega|} = \frac{6}{36} = \frac{1}{6}$

9. $\Omega = \{1, 2, 3, \ldots, 6\}$ $P_1 + P_2 + P_3 + P_4 + P_5 + P_6 = 1$ $P_1 = p$ $P_2 = 2p$ $P_3 = 3p$ $P_4 = 4p$ $P_5 = 5p$ $P_6 = 6p$

$p + 2p + 3p + 4p + 5p + 6p = 1$ $21p = 1$ $p = \frac{1}{21}$

$Pr(\text{even } \#) = Pr(2) + Pr(4) + Pr(6) = \frac{2}{21} + \frac{4}{21} + \frac{6}{21} = \frac{12}{21} = \frac{4}{7}$

11. 5 ppl L→R ↑ing order $|\Omega| = 5!$

$Pr(\text{correct order}) = \frac{1}{|\Omega|} = \frac{1}{5!} = \frac{1}{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = \frac{1}{120}$

13. 5 cards from 52 deck P 1st 4 are Aces & 5th is a King

$Pr(A, A, A, A, K) = \frac{4}{52} \cdot \frac{3}{51} \cdot \frac{2}{50} \cdot \frac{1}{49} \cdot \frac{4}{48} = \frac{4 \cdot 3 \cdot 2 \cdot 1 \cdot 4}{52 \cdot 51 \cdot 50 \cdot 49 \cdot 48} = \frac{96}{311{,}875{,}200} = \frac{1}{3{,}248{,}700}$

15. $|\Omega| = 4!$ $Pr(\text{correct hat order}) = \frac{1}{|\Omega|} = \frac{1}{4!} = \frac{1}{4 \cdot 3 \cdot 2 \cdot 1} = \frac{1}{24}$

17. $|\Omega| = \binom{7}{3}$ a. $Pr(\text{Dopey}) = \frac{\binom{6}{2}}{\binom{7}{3}} = \frac{\frac{6 \cdot 5}{2 \cdot 1}}{\frac{7 \cdot 6 \cdot 5}{3 \cdot 2 \cdot 1}} = \frac{3}{7}$ b. $Pr(\text{Dopey} \cap \text{Sneezy}) = \frac{5}{\binom{7}{3}} = \frac{1}{7}$

c. $Pr(\text{Dopey}^c \cap \text{Sneezy}^c) = \frac{\binom{5}{3}}{\binom{7}{3}} = \frac{2}{7}$