

Solutions to Pre-Class Problems for 22 Jan

1.1

② a) $O = \{HHHH, HHHT, HHTH, HTTH, THHH, HHTT, HTTH, TTHH, HTHT, THTH, THHT, HTTT, THTT, \cancel{TTHT}, TTTT\}$

b) i) $P(A) = 5/16$

ii) $P(A \cap B) = 0$ (cannot have at least 3 + at most 2 at the same time)

iii) $P(B) = 11/16$

vi) $P(A \cup C) = \cancel{10/16}^{9/16} = P(A) + P(C) - P(A \cap C)$
 $= \frac{5}{16} + \frac{8}{16} - \frac{4}{16} = \frac{9}{16}$

v) $P(D) = 9/16$

iv) $P(A \cap C) = 4/16$

vii) $P(B \cap D) = 4/16$

④ a) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
 $= 0.4 + 0.5 - 0.3 = \boxed{0.6}$

b) $P(A \cap B') = \cancel{P(A) + P(B') - P(A \cap B)}$

$$A = (A \cap B') \cup (A \cap B)$$

$$P(A) = P(A \cap B') + P(A \cap B)$$

$$0.4 = P(A \cap B') + 0.3$$

$$\boxed{P(A \cap B') = 0.1}$$

~~$P(B') = 1 - P(B)$
 $= 1 - 0.5$
 $= 0.5$~~

c) $P(A' \cup B') = P[(A \cap B)'] = 1 - P(A \cap B) = 1 - 0.3 = \boxed{0.7}$

⑥ a) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
 $0.7 = 0.4 + 0.5 - P(A \cap B)$

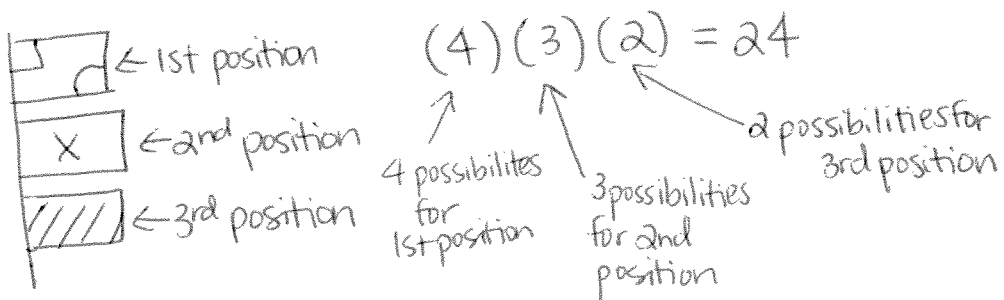
$$P(A \cap B) = 0.2$$

$$\begin{aligned} \text{b) } P(A' \cup B') &= P[(A \cap B)'] = 1 - P(A \cap B) \\ &= 1 - 0.2 \end{aligned}$$

$$P(A' \cup B) = 0.8$$

1.2

② use multiplication principle:



⑥ {FFF, FFRF, FRFF, ^{RFF}FFRF, FRFRF, RFFRF, FRRFF, RFRFF, RRFFF, RRR, RRFR, FRRR, RFRR, ~~RRRR~~ RRFR, RFRFR, FRRFR, RFFRR, FRFRR, FRRRR} = 20 outcomes

⑧ ~~$\binom{n-1}{r}$~~ $\binom{n-1}{r} + \binom{n-1}{r-1} = \frac{(n-1)!}{r!(n-1-r)!} + \frac{(n-1)!}{(r-1)!(n-r)!}$
 $= \frac{(n-r)(n-1)! + r(n-1)!}{r!(n-r)!} = \frac{n!}{r!(n-r)!} = \boxed{\binom{n}{r}}$