Math 1320 Practice Exam 3

① $A = \{2, 5, 8, z, \$\}$, $B = \{5, \uparrow, z, 8, p\}$, and $C = \{2, z, 9, p, \Delta\}$

a) $A \cup (B \cap C) = A \cup \{z, p\} = \{2, 5, 8, z, 8, p\}$

b) $(A \cup B) \cap C = \{2, 5, 8, z, \$, \uparrow, p\} \cap C = \{2, z, p\}$

c) $A \cap (B \cup C) = A \cap \{5, \uparrow, z, 8, p, 2, 9, \Delta\} = \{2, 5, 8, z\}$

d) $A \cap (B \cap C) = A \cap \{z, p\} = \{z\}$

e) $n(A \times B) = n(A) \times n(B) = 5 \times 5 = 25$

② 46 total; 31 sleeping 24 hats gives 55 people

55 − 46 = 9 overlaps

So 9 people were sleeping and also wearing hats

③ Cardinality is "number of"

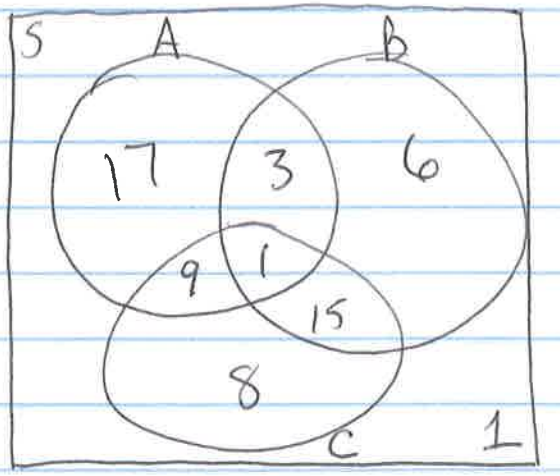
a) two distinguishable dice add to 8: (2,6), (3,5), (4,4), (5,3), (6,2)

So cardinality is 5

b) three indistinguishable coins: HHH, HHT, HTT, TTT

So cardinality is 4

④



$n(A) = 30$ → 30 − 13 = 17

$n(B) = 25$ → 25 − 19 = 6

$n(C) = 33$ → 33 − 25 = 8

$n(A \cap C) = 10$ → 10 − 1 = 9

$n(S) = 60$

last 17 + 3 + 6 + 9 + 1 + 15 + 8 = 59

60 − 59 = 1 floating inside box, outside circles

(5) Part A and then Part B or Part C

$2^7 \times (5^3 + 4^3)$ (possibilities)$^{\#\text{questions}}$

$128(125+64)$

$128(189) = 24{,}192$ answer sheets possible

(6) a) An author is successful and new

200 total authors 16 in overlap $16/200 = 2/25$

b) An author is a new author

200 total authors 54 new $54/200 = 27/100$

c) A successful author is established

60 total successful 44 looking only at successful find established $44/60 = 11/15$

d) An established author is successful

146 total established 44 successful in established $44/146 = 22/73$

e) An unsuccessful author is new

140 total unsuccessful 38 new & unsuccessful $38/140 = 19/70$

(7) 4R 3G 2W 1P grabs 5 $C(10 \text{ total have}, 5 \text{ total want}) = 252$

$n(S)$ = our denominator

a) None of the red: $C(4,0)^{\text{red}} \times C(6,5)^{\text{others}} = 1 \times 6 = 6$ $6/252 = 1/42$

b) At least one white: $C(2,1)^{1W} \times C(8,4) + C(2,2)^{2W} \times C(8,3)$ or

$= 2 \times 70 + 1 \times 56 = 140 + 56 = 196$ $\frac{196}{252} = \frac{7}{9}$

c) At most one green: $C(3,0)^{0G} \times C(7,5) + C(3,1)^{1G} \times C(7,4)$ or

$= 1 \times 21 + 3 \times 35 = 21 + 105 = 126$ $\frac{126}{252} = \frac{1}{2}$

d) 2G and 1 of each other: $C(4,1)_R \times C(3,2)_G \times C(2,1)_W \times C(1,1)_P = 4 \cdot 3 \cdot 2 \cdot 1 = 24$ $\frac{24}{252} = \frac{2}{21}$

e) all the red: $C(4,4)^{\text{red}} \times C(6,1)^{\text{other}} = 1 \times 6 = 6$ $6/252 = 1/42$

(8) N, D, Q

a) $n(N \times D \times Q) = 2 \times 2 \times 2 = 8$ HHH, HHT, HTH, HTT, THH, THT, TTH, TTT

b) E = At most 1T F = Q is heads

i) $n(E) = 4$ (HHH, HHT, HTH, THH)

ii) $n(F) = 4$ (HHH, HTH, THH, TTH)

iii) $n(E \cap F) = 3$

iv) $P(E) = \frac{4}{8} = \frac{1}{2}$

v) $P(F) = \frac{4}{8} = \frac{1}{2}$

vi) $P(E \cap F) = \frac{3}{8}$

(9) $P(A|B) = \frac{P(A \cap B)}{P(B)}$ independent: $P(A \cap B) = P(A)P(B)$

a) $P(A|B) = \frac{P(A \cap B)}{P(B)} \rightarrow 0.1 = \frac{P(A \cap B)}{0.4}$ so $P(A \cap B) = 0.04$

b) $P(A|B) = \frac{P(A)P(B)}{P(B)} = P(A) = 0.7$ B has nothing to do with A

c) $P(A \cap B) = 0.7 \times 0.2 = 0.14$

More problems to practice by looking over the quizzes listed for Exam 3 on my website.