Q6 !

# ST2334 - Tutorial 1

Week 3

1 (a). $S = \{3, 4, 5, 13, 14, 15, 23, 24, 25, 123, 124, 125, 213, 214, 215\}$

(b). $A = \{3, 4, 5\}$

(c). $B = \{5, 15, 25, 125, 215\}$

(d). $C = \{3, 4, 5, 23, 24, 25\}$

(e). No. $A \cap B = \{5\} \neq \phi$

2. $A = \{2, 4, 6, 8, 10\}$, $B = \{1, 3, 5, 7, 9\}$,
$C = \{2, 3, 4, 5\}$, $D = \{1, 6, 7\}$

(a). $A \cup C = \{2, 3, 4, 5, 6, 8, 10\}$

(b). $A \cap B = \phi$

(c). $C' = \{1, 6, 7, 8, 9, 10\}$

(d). $A \cap C \cap D' = \{2, 4\}$

3. Digits : 0, 2, 4, 6, 8, 9

(a). n(three-digit numbers) = 5 × 5 × 4
= 100 ✓

(b). n(odd numbers) = 4 × 4 × 1
= 16 ✓

(c). Case 1 : 629 : 1 × 1 × 1 = 1
Case 2 : > 62_ : 1 × 3 × 1 = 3 ✗ 2
Case 3 : 8_9 : 1 × 4 × 1 = 4
∴ Total no. = 1 + 3 + 4
= 8 ✗ 7

4(a). n(no restrictions) = 8!
= 40 320 ✓

(b). n(couples together) = 4! × 2! ✗ (2!)⁴
= 48 ✗ 384

(c). n(women left, men right) = 4! × 4!
= 576 ✓

5(a). $n(\text{no restriction}) = \binom{7}{5}$

$= 21$ ✓

(b). $n(\text{first two questions must be answered}) = \binom{5}{3}$

$= 10$ ✓

(c). Case 1: exactly one of first two: $\binom{2}{1} \times \binom{5}{4} = 10$

Case 2: both : 10 (from part (b))

$\therefore n(\text{at least one of first two must be answered}) = 10 + 10$

$= 20$ ✓

(d). $n(\text{exactly two from first three}) = \binom{3}{2} \times \binom{4}{3}$

$= 12$ ✓

6(a). $n(\text{regardless}) = \frac{(13+8)!}{13!\,8!}$

13 U's, 8 R's $\Rightarrow$ rearrange

(b). $n(\text{pass Y}) = {}_{16}C_{10} \times {}_5C_3$

$n(\text{avoid Y}) = \text{total} -$ ↑

(c). $n(\text{ways}) = {}_4C_2 \times \left[ {}_{17}C_{11} - {}_{12}C_8 \times {}_5C_3 \right]$

A → X; total X → B; pass Y X → B

7(a). $n(\text{ways}) = 9 \times 27$

$= 243$ ✓

(b). $n(\text{ways}) = 9 \times 27 \times 15$

$= 3645$

$\therefore n(\text{years}) = 3645 \div 7 \div 52$

$\approx 10$ ✓

8. "w", "h", "i", "t", "e"

(a). $n(\text{begins with consonant}) = {}^3P_1 \times 4!$

$= 72$ ✓

(b). $n(\text{ends with vowel}) = 4! \times {}^2P_1$

$= 48$ ✓

(c). $n(\text{alt. vowels and consonants}) = 3! \times 2!$

$= 12$ ✓

9. $n(\text{ways}) = \binom{9}{6} \times 6! \times 3!$

$= 362\,880$ ✓

10. $n(\text{ways}) = \frac{9!}{3!\,4!\,2!}$

$= 1260$

11 (a). $A \cup B = A \longrightarrow B \subset A$

(b). $A \cap B = A \longrightarrow A \subset B$