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CS-225: Discrete Structures in CS
Homework 7, Part 1

Exercise Set 9.2: Problem 12

B: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F
(10 digits; 13 digits)

First: 10 ways Last: 13 ways 4 = 16 ways

$10 \times 16 \times 16 \times 16 \times 16 \times 13$

$= 8,519,680$

Exercise Set 9.2: Problem 14

C: IGIF ###
10 choices per digit $= 10 \times 10 \times 10$
1 choice for 4 $= 1 \times 1 \times 1 \times 1 = 1$

$1 \times 10 \times 10 \times 10$

$= 1,000$

E: AB XY ###
24 choices
23 choices $(24 - x) = (24 - 1) = 23$
10, 9, 8 (one less as they are all unique)
1 choice for 2 $= 1 \times 1 = 1$

$1 \times 24 \times 23 \times 10 \times 9 \times 8 = 397,440$

Exercise Set 9.2: Problem 17

C: from 1,000 → 9,999

1st digit = 9 ways ($1^{st} \neq 0$)
2nd digit = 9 ways (can be 0, but $\neq 1^{st}$)
3rd digit = 8 ways ($\neq 1^{st}$ & 2^{nd})
4th digit = 7 ways ($\neq 1^{st}, 2^{nd}$, & 3^{rd})

$9 \times 9 \times 8 \times 7$

$= 4,536$

D: from 1,000 → 9,999

5 odds = 1, 3, 5, 7, 9
1st digit = 8 ways ($\neq 0$ or 4^{th} digit)
2nd digit = 8 ways (can be 0, but $\neq 1^{st}$ & 4^{th})
3rd digit = 7 ways ($\neq 1^{st}, 2^{nd}, 4^{th}$)
4th digit = 5 ways (all odds)

$8 \times 8 \times 7 \times 5$

$= 2,240$

Exercise Set 9.3: Problem 5

A: Div by 5 = 0, 5

1: if 0 = $9 \times 10 \times 10 \times 10 = 9,000$
($2^{nd}, 3^{rd}$, & 4^{th} can be any digit; cannot be 0)

2: if 5 = $9 \times 10 \times 10 \times 10 = 9,000$

ANS: $9000 + 9000 = 18,000$

Exercise Set 9.3: Problem 24

A: X = all integers from 1 through 1000 that are multiples of 2
Y = all integers from 1 through 1000 that are multiples of 9

$X \cup Y$ (multiples of 2 or 9) and $X \cap Y$ (multiples of both 2 & 9)

ANS = the set of all integers that are multiples of 9×2 (18) from 1 through 1000

C: $N[(A \cup B)'] = N(U - A \cup B)$
$= N(U) - N(A \cup B)$
$= 444$

Exercise Set 9.3: Problem 33

E: $N(C \cap D) - N(H \cap C \cap D)$

ANS = 1 (3 - 2)

Exercise Set 9.3: Problem 34

D: $N(A) - N(B \cap A) - N(A \cap C) + N(A \cap B \cap C)$

$= 21 - 9 - 14 + 6 = 4$

ANS = 4