Name: Richard

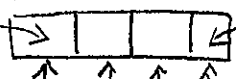
QUIZ 12 ♠

MATH 211
February 28, 2023

1. How many 4-digit numbers are even or divisible by 5?
(Examples: 9764, 4475 and 4470 are even or divisible by 5, but 5421 is not.)

$A = (\text{set of even 4-digit \#'s})$

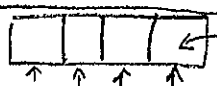
No 0 here



0, 2, 4 6 or 8 here

$|A| = 9 \cdot 10 \cdot 10 \cdot 5 = 4500$

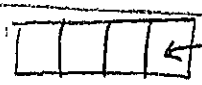
$B = (\text{set of 4-digit \#'s that are divisible by 5})$



0 or 5 here

$|B| = 9 \cdot 10 \cdot 10 \cdot 2 = 1800$

$A \cap B = (\text{set of 4-digit \#'s that are even and divisible by 5})$



only 0 here

$|A \cap B| = 9 \cdot 10 \cdot 10 \cdot 1 = 900$

Answer: $|A \cup B| = |A| + |B| - |A \cap B| = 4500 + 1800 - 900$

$= 4500 + 900$

$= \boxed{5400}$

By inclusion-exclusion

Name: Richard

QUIZ 12 ♢

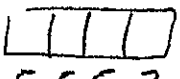
MATH 211
February 28, 2023

1. A length-4 list is made from the letters A, B C, D, E, with repetition allowed.
How many such lists begin **or** end with a vowel?

$A = (\text{set of lists that begin with vowel})$

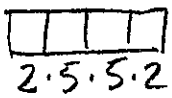
$|A| = 2 \cdot 5 \cdot 5 \cdot 5 = 250$

$B = (\text{set of lists That end with vowel})$



$|B| = 5 \cdot 5 \cdot 5 \cdot 2 = 250$

$A \cap B = (\text{set of lists that begin and end in a vowel})$



$|A \cap B| = 2 \cdot 5 \cdot 5 \cdot 2 = 100$

Answer: $|A \cup B| = |A| + |B| - |A \cap B| = 250 + 250 - 100$

$= \boxed{400}$

By inclusion-exclusion

Name: Richard

QUIZ 12 ♣

MATH 211
February 28, 2023

1. A length-4 list is made from the letters A, B C, D, E, with repetition allowed.
How many such lists begin with a vowel **or** end with a consonant?

A = (set of lists beginning with vowel) $|A| = 2 \cdot 5 \cdot 5 \cdot 5 = 250$

B = (set of lists ending with consonant) $|B| = 5 \cdot 5 \cdot 5 \cdot 3 = 375$

$A \cap B$ = (lists beginning with vowel and ending with a consonant) $|A \cap B| = 2 \cdot 5 \cdot 5 \cdot 3 = 150$

Answer: $|A \cup B| = |A| + |B| - |A \cap B|$

$= 250 + 375 - 150 = \boxed{475}$

By inclusion-exclusion

Name: Richard

QUIZ 12 ♡

MATH 211
February 28, 2023

1. A length-4 list is made from the letters A, B C, D, E, with repetition allowed.
How many such lists begin with a vowel **or** have no repeated letters?
(Examples: EDCC, EAAA, ABCD, DCAE, BCDE.)

A = (set of lists beginning with vowel) $|A| = 2 \cdot 5 \cdot 5 \cdot 5 = 250$

B = (set of lists without repetition) $|B| = 5 \cdot 4 \cdot 3 \cdot 2 = 120$

$A \cap B$ = (set of lists beginning with vowel and having no repetition) $|A \cap B| = 2 \cdot 4 \cdot 3 \cdot 2 = 48$

Answer: $|A \cup B| = |A| + |B| - |A \cap B|$

$= 250 + 120 - 48$

$= 370 - 48 = \boxed{322}$

By inclusion-exclusion