Problem Set 10: Discrete Mathematics Name Theepakorn Phayaphat ID 6570113352

1. A multiple choice test contains 10 questions. There are four possible answers for each question.

(a) How many ways can a student answer the questions on the test if every question is answered?

4^{10}

(b) How many ways can a student answer the questions on the test if the student can leave answers blank?

5^{10}

2. How many strings are there of four lowercase letter that have the letter x in them?

$26^4 - 25^4$

3. How many string of the three decimal digits

(a) do not contain the same digit three times.

Answer = All possibilities − Unwanted Cases = Allposibilities − {000, 111, 222, ... 999}

$= 10^3 - 10 = 990$

(b) begin with an odd digit.

$5 \cdot 10 \cdot 10 = 500$ (odd, Anything, Anything)

(c) have exactly two digits that are 4s.

x44, 4x4, 44x — All posible x

$3 \times 9 = 27$

4. How many permutations of the characters in the word COMPUTER are there? How many of these end in a vowel? ① ②

The rest Vowels

7 6 5 4 3 2 1 3

① $= 8!$

② $= 7!(3)$

5. How many distinct permutations of the characters in ERROR are there?

$\frac{\text{All}}{\text{Overcount}} = \frac{5!}{3!} = 20$

6. In how many ways can you seat 11 men and eight women in a row if no two women are to sit together?

Men = 11 seperators

Women = Object in 12 available slots

$11! \binom{12}{8} 8!$

7. A set of four coins is selected from a box containing five dimes and seven quarters.

(a) Find the number of sets which has two dimes and two quarters.

$\binom{5}{2}\binom{7}{2} = 10 \times 21 = 210$

(b) Find the number of sets composed of all dimes or all quarters.

$\binom{5}{4} + \binom{7}{4} = 5 + 35 = 40$

Problem Set 10: Discrete Mathematics Name Theepakorn Phayonnat ID 6701135Z

8. How many integers from 1 to 1000 are either multiples of 3 or multiples of 5?

$n(A \cup B) = \left\lfloor \frac{1000}{3} \right\rfloor + \left\lfloor \frac{1000}{5} \right\rfloor - \left\lfloor \frac{1000}{15} \right\rfloor = 333 + 200 - 66$

$= 533 - 66 = 467$ ※

9. In a class of students undergoing a computer course the following were observed. Out of a total of 50 students: 30 know Pascal, 18 know Fortran, 26 know COBOL, 9 know both Pascal and Fortran, 16 know both Pascal and COBOL, 8 know both Fortran and COBOL, 47 know at least one of the three languages.

a. How many students know none of these languages?

$n[(P \cup F \cup C)'] = 50 - 47 = 3$ ※

b. How many students know all three languages?

$n(U) = 50$

Pascal $= n(P) = 30$

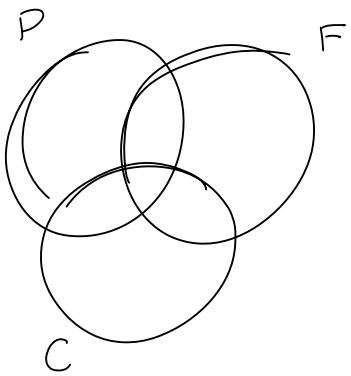
Fortran $= n(F) = 18$

Cobal $= n(C) = 26$

$n(P \cap F) = 9$

$n(P \cap C) = 16$

$n(F \cap C) = 8$



$n(U) = n(P) + n(F) + n(C) - n(P \cap F) - n(P \cap C) - n(F \cap C) + n(P \cap F \cap C) + n[(P \cup F \cup C)']$

$50 = 30 + 18 + 26 - 9 - 16 - 8 + n(P \cap F \cap C) + 3$

$50 = 24 + 10 + n(P \cap F \cap C) \rightarrow n(P \cap F \cap C) = 6$ ※