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CS-225: Discrete Structures in CS
Homework 8, Part 1
Exercise Set 9.2: Problem # 32.c, #33.c (Please ignore the suppositions made on parts a) and b)), #34(Please change the situation to having 8 seats and 8 people sitting around the table), #39.(b, d)
Exercise Set 9.5: Problem #20.(a, b, c)

Set 9.2:

32. c) AL[GOR]ITHM. This creates 7 character spaces or opportunities.
Therefore 7! [ans]

33. c) [1,2] [3,4] [5,6] are the pairs of couples, where 1,3,and 5 are the older members of each pair, therefore they are staying on the left. Which leaves the pairs as written [immutable]
[ans] $\frac{3!}{3} = \frac{6}{3} = 2$ *potential ways in which the table can be seated*.

34. There are 8 people at the table seated and rotated order is the same.
[ans] For n amount of people you have (n-1)! Permutations
$(8-1)! = 7! = 5{,}040$

39.

b) Using Theorem 9.2.3: $\frac{n!}{(n-r)!} for\ P(n,r)$
$[ans]\ \ \frac{9!}{(9-6)!} = \frac{9!}{3!} \equiv 9(8)(7)(6)(5)(4) = 60{,}480$

d) Choose a combination of 6 letters out of 9 total to choose from. The first two are OR
[OR] _ _ _ _ now there are four spaces to place letters.
9-2=7 [2 letters are already being used, OR], so 7=n
$[ans] \frac{7!}{(7-4)!} = \frac{7!}{3!} \equiv 7(6)(5)(4) = 840$

Set 9.5:

20.

a) MILLIMICRON = 11 letters to arrange
M=2, I=3, L=2, C=1, R=1, O=1, N=1
$[ans] \frac{11!}{3!\times 2!\times 2!} = \frac{39{,}916{,}800}{6\times 2\times 2} = \frac{39{,}916{,}800}{24} = 1{,}663{,}200$

b) MILLIMICRON with M at beginning and N at end.
M=1, I=3, L=2, C=1, R=1, O=1, N=0
11-2 = 9 spaces to be filled by the leftover letters.
$[ans] \frac{9!}{3!\times 2!} = \frac{362{,}880}{12} = 30{,}240$

c) MILLIMICRON → MILLIMI[CR][ON] creates 9 elements.
M=2, L=2, I=3
$[ans] \frac{9!}{3!\times 2!\times 2!} = \frac{362{,}880}{24} = 15{,}120$