Casey Levy

CS 225: Discrete Structures in CS

Homework 8, Part 1

Set 9.2

#32c.

In the word ALGORITHM, there are 9 total letters, but if we need to keep GOR together, then there are now 7 elements(letters) available. 7! = 5040

#33a

If 6 people are sitting in exactly 6 seats, that gives us 6! = 720.

b.

If there are 2 aisle seats and the doctor must use one of them, lets assume they first use the left most aisle seat which then gives us now only 5 people able to freely choose seats. 5! = 120. If the doctor uses the right most aisle seat, we still have 5! = 120. 120 + 120 = 240 different ways.

c.

Since out of the 6 people, there are 3 married couples, then this gives us 3! = 6.

#39b.

We need 6 of the 9 letters.

$$P\,(9,6) = \frac{9!}{(9-6)!} = \frac{9!}{3!} = 9 \times 8 \times 7 \times 6 \times 5 \times 4 = 60{,}480$$

d.

If OR must be together, then we have 4 of 7 letters available.

$$P\,(7,4) = \frac{7!}{(7-4)!} = \frac{7!}{3!} = 7 \times 6 \times 5 \times 4 = 840$$

Set 9.5

#7b (i).

$$C\,(6,3) = \frac{6!}{3!(6-3)!} = \frac{6!}{3!} = 20$$

$$C\,(7,4) = \frac{7!}{4!(7-4)!} = \frac{7!}{4!3!} = \frac{7!}{3!} = 35$$

35 x 20 = 700

(ii).

C (13, 7) – C(7,7) = 1715

(iii).

C(6,4) x C(7,3) + C(6,5) x C(7,2) + C(6,6) x C(7,1) = 658

#14a.

C (16,7) = 11,440

b.

C (16,3) = 560

C (16,14) = 120

C (16,15) = 16

C (16,16) = 1

560 + 120 + 16 + 1 = 697

c.

Using the multiplication rule we know there are 2^16 outcomes which is 65,536.

Knowing we are selecting 0 of the 16 bits as a 1 we get C (16,0) = 1

65,536 – 1 = 65,535

d.

C(16,0) = 1 way to select no 1s

C (16,1) = 16 ways to select one 1

16 + 1 = 17

#20a.

MILLIMICRON has 11 total letters and 7 distinct letters. Permutation of Indistinguishable objects gives us

$\frac{11!}{2!3!2!1!1!1!1!}$ = 1,663,200

b.

11 total, 9 letters if M and N have specific locations

$\frac{9!}{3!2!1!1!1!1!}$ = 30,240

c.

11 total, 2 sets of letters must be together, still giving us 9 choices

$$\frac{9!}{3!2!2!1!1!} = 15{,}120$$