Jay Patel

Hw #6

CS 230

Q3.

n + m = people;
round table for n;
m = bench
$\binom{n+m}{n} * (n-1)! * m!$

Where;

n + m = number of people
n is = choosing n people
n – 1 = for the table capacity
m! = number of people on the bench that can fit

So in this case we are to find number of ways in order to seat few amount of people and that number is n + m, now we have to decide the number of seats so that is why there is n in there all the people who are left are m's.
Next comes to a conclusion that we have to choose n people out of n + m that can be seated at the round table, which is then multiplied by how many ways we can allow them to seat, and hence there is no fixed positions that people can seat that's why we have multiply for remaining people who are left.

Q4. Given that;

$$x_0 + y_1 + y_2 + z_1 = 70 - - - - - - \rightarrow 1$$
$$x_0 + y_1 + y_3 + z_2 = 50 - - - - - - \rightarrow 2$$
$$x_0 + y_2 + y_3 + z_3 = 40 - - - - - - \rightarrow 3$$

$$x_0 + y_1 = 30 - - - - - \rightarrow 4$$
$$x_0 + y_2 = 20 - - - - - \rightarrow 5$$
$$x_0 + y_3 = 20 - - - - - \rightarrow 6$$

$$x_0 + y_1 + y_2 + y_3 + z_1 + z_2 + z_3 = 100 - - - - - \rightarrow 7$$

from equation 1,2 and 3 we get,

3x + $21y_1 + y_2 + y_3 + z_1 + z_2 + z_3 = 160 - - - - - \rightarrow 8$

from equation 4,5 and 6 we get,

3x + $1y_1 + y_2 + y_3 = 70$

so, $y_1 + y_2 + y_3 = 70 - 32 - - - - - \rightarrow 9$

from equation 8,

3x + 2(38) + $z_1 + z_2 + z_3 = 160$

$z_1 + z_2 + z_3 = 20 + 32 - - - \rightarrow 10$

by substituting equation 9 and 10 in equation 7 we get,

x + 70 - ~~3x~~ + 20 + ~~3x~~ = 100

x = 10%

Q8.

$a.$

$$\frac{n!}{p_1!\ p_2!\ \ldots .\, p_k!}$$

$\frac{9!}{3!\,.\ 2!}$ $\quad we\ can\ tell\ that\ there\ are\ 3\ of\ kind\ A\ and\ 2\ of\ Kind\ F$

so, $\frac{9!}{3!\,.2!} = \frac{9*8*7*6*5*4}{2*1} = 30{,}240$

b.

$$\frac{5!}{5!} = 1$$

c.

Total A = 5

Total B = 2

Total R = 2

So, $\frac{11!}{5!*2!*2!} = \frac{11*10*9*8*7*6}{2!*2!}$ = 83,160

Q. Consider a 3×4 units' rectangle. Show that for an arbitrary placing of six (6) points within this rectangle, there are at least two points that are 5 units apart.

let's divide the triangle in 5 different sections, we can then tell that the longest distance in middle of any two points is $\sqrt{5}$ but if we have at least 6 points and if we place each other than it will be greater than $\sqrt{5}$ apart from the first 5 points that we got earlier and will collaborate into each of the other 5 sections. But since we had 5 points before and 5 points for this one, we have one left which is basically pigeonhole rule; so applying that rule we can place those points in our 3 * 4 rectangle and 2 sections will be in one section and then we can say that the largest distance in middle of 2 points is at least $\sqrt{5}$. So with every arbitrary point you can get up to $\sqrt{5}$.