Tut 2.

1. (i) $10! = 10 \times 9 \times 8 \times \dots \times 1 = 3628800$

(ii) $\begin{bmatrix} 10 \\ 3 \end{bmatrix} = \frac{10!}{7!} = 720$

(iii) $\begin{bmatrix} 10 \\ 7 \end{bmatrix} = \frac{10!}{3!} = 604\,800$

(iv) $\binom{21}{19} = \frac{21!}{19!\,2!} = 210$

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2. (i) $\frac{n!}{(n-1)!} = \frac{n(n-1)!}{(n-1)!} = n$

(ii) $\frac{(n+2)!}{n!} = \frac{(n+2)(n+1)n!}{n!} = (n+2)(n+1)$

$= n^2 + 3n + 2$

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3. $63 \times 34 = 2142$

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4. 3, 4, 5, 6, 7, 9

a) 3 digit nos : ${}^6P_3 = \frac{6!}{3!} = 120$

OR $6.5.4 = 120$

b) < 400 = 7 nos. begin with 3 : 3__

$\therefore$ have 5 to choose from for 2nd digit
4 to choose from for 3rd digit

$\Rightarrow$ $5 \times 4 = 20$ ways.

Tut 2

4b cont OR For last 2 digits: ${}^5P_2 = \frac{5!}{3!} = 20$.

c) Even no. $\Rightarrow$ __4 OR __6

$\Rightarrow 2 \times {}^5P_2 = 40$

d) Multiple of 5 $\Rightarrow$ __5 $\Rightarrow {}^5P_2 = 20$

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5. 4 Boys 3 Girls.

a) in a row: $7! = 5040$

b) Boys in a group, Girls in a group: BBBB GGG

OR GGG BBBB

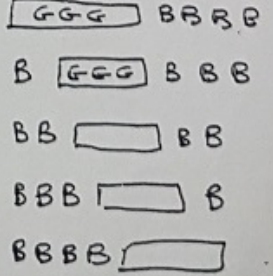
4! for arranging boys; 3! for arranging girls; 2! for arranging groups

$\therefore$ no. of ways $= 4! \times 3! \times 2! = 288$

OR ${}^4P_4 \times {}^3P_3 \times {}^2P_2 = 288$

c) Girls in a group, boys scattered:

$5 \times 4! \times 3! = 720$



Tut 2

6. (a) THEM : ${}^4P_4 = 4! = 24$

(b) UNUSUAL: $\frac{7!}{3!\,1!\,1!\,1!\,1!} = 840$

(c) SOCIOLOGICAL: $\frac{12!}{3!\,2!\,2!\,2!} = 9979200$

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7. (i) No. of distinct ways of arranging 6 flags where 4 are red and 2 are blue is

$$N_D = \frac{6!}{4!\,2!} = 15.$$

ii) How to put 4 things in 6 places OR
How to put 2 things in 6 places
where order does not matter:

$${}^6C_4 = {}^6C_2 = 15.$$

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8. 8 balls : ordered samples of size 3.

i) replacement : $8 \times 8 \times 8 = 512$

ii) no replacement : $8 \times 7 \times 6 = {}^8P_3 = \frac{8!}{3!} = 336$

Tut 2

9. 4 in delagation ; 12 to choose from.

a) no restrictions: ${}^{12}C_4 = \frac{12!}{4!8!} = 495.$

b) Say A + B will not go together.
Then the delagation can be made up in 3 ways:

A + 3 others (B is not one of them) $= {}^{10}C_3$
OR B + 3 others (A is not one of them) $= {}^{10}C_3$
OR 4 students (A and B excluded) $= {}^{10}C_4$

450.

OR ${}^{12}C_4 - {}^{10}C_2$

c) 2 students married : married 2 + 2 others : ${}^{10}C_2$
4 others : ${}^{10}C_4$

${}^{10}C_2 + {}^{10}C_4 = 255$

---

10. 8 out of 10 questions

a) no restrictions: ${}^{10}C_8 = 45$

b) at least 4 of first 5 $\Rightarrow$ 4 or 5

$({}^5C_4 \times {}^5C_4) + ({}^5C_5 \times {}^5C_3)$

$= 35.$

11. 1 or more from 6

1: ${}^6C_1 = 6$

2; ${}^6C_2 = 15$

3; ${}^6C_3 = 20$

4; ${}^6C_4 = 15$

5; ${}^6C_5 = 6$

6: ${}^6C_6 = 1$

63.