MDM4U HW4

P280 : Q12, Q13, Q17.

P287-288: Q8, Q16, Q18, Q20.

Sol. Q12. Using combination and Rule of Product.

$10C_6 \times 15C_6 = 1051050$ (ways)

Q13. 15 technicians, 11 chemists.

a) $26C_5 = 65780$ (ways)

b) $15C_1 \times 11C_4 = 4950$ (ways)

c) $11C_1 \times 15C_4 = 15015$ (ways)

d) $11C_2 \times 15C_3 = 25025$ (ways)

e) $15C_5 + 11C_5 = 3465$ (ways)

Q17. 6 yellow, 5 blue, 8 white.

$6C_3 \times 5C_2 \times 8C_4 = 14000$ (ways)

P287 Q8.

a) $30C_6 = 593775$ (teams)

P287. Q8.

b) $_3C_3 \times {}_{27}C_3 = 2925$ (teams)

c) $_{30}C_6 - {}_3C_3 \times {}_{27}C_3$

$= 590850$ (teams)

Q16 a)

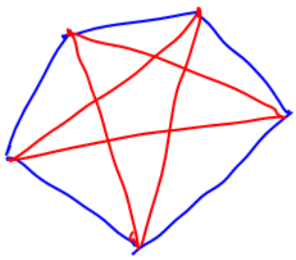
i) $n = 5$.

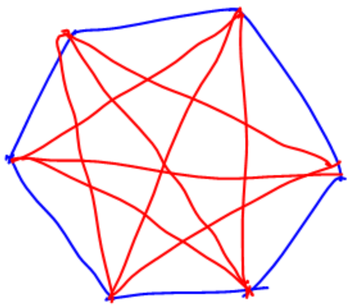
$_5C_2 - 5 = 10 - 5 = 5$ (diagonals)

ii) $n = 6$.

$_6C_2 - 6 = 15 - 6 = 9$ (diagonals)

b)





For a n-polygon, the number of its diagonals is

$_nC_2 - n$.

Q18. Indirect Method.

Total number of assignments with restriction

$$_{12}C_2 \cdot {}_{10}C_4 \cdot {}_6C_6 = 13860 \text{ (ways)}$$

door floor floater

case 1. Joe and Jim at door

$$_2C_2 \cdot {}_{10}C_4 \cdot {}_6C_6 = 210 \text{ (ways)}$$

door floor floater

case 2. Joe and Jim on floor

$$\underbrace{_2C_2 \cdot {}_{10}C_2}_{\text{floor}} \cdot {}_8C_2 \cdot {}_6C_6 = 1260 \text{ (ways)}$$

door floater

case 3. Joe and Jim as floaters

$$\underbrace{_2C_2 \; {}_{10}C_4}_{\text{floater}} \; {}_6C_2 \; {}_4C_4 = 3150 \text{ (ways)}$$

door floor

$$13860 - 210 - 1260 - 3150 = 9240 \text{ (ways)}$$

is the answer

Direct Method.

case 1. One of Joe and Jim at door

$$\underbrace{_1C_1 \cdot {}_{10}C_1}_{\text{door}} \cdot {}_{10}C_4 \cdot {}_6C_6 = 2100 \text{ (ways)}$$

floor floater

case 2. One of Joe and Jim on floor

$$\underbrace{_1C_1 \; {}_{10}C_3}_{\text{floor}} \cdot {}_8C_2 \cdot {}_6C_6 = 3360 \text{ (ways)}$$

door floater

case 3. one of Joe and Jim as floater

$$\underbrace{{}_1C_1 \cdot {}_{10}C_5}_{\text{floater}} \cdot \underbrace{{}_6C_2}_{\text{door}} \cdot \underbrace{{}_4C_4}_{\text{floor}} = 3780 \text{ (ways)}$$

so $2100 + 3360 + 3780 = 9240$ (ways)

Q20.

ABCDEFGABCDEFG ⋯ ABCDEFGABC

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a) 8 As, Bs, Cs; 7 Ds, Es, Fs, Gs

i) ${}_8C_5 = {}_8C_3 = 56$. (ways)

ii) ${}_7C_5 = {}_7C_2 = 21$ (ways)

iii) $3({}_8C_5) + 4({}_7C_5) = 3 \times 56 + 4 \times 21 = 252$ (ways)

iv) ${}_7C_5 = 21$ (ways)

b) i) ${}_8P_5 = 6720$ (ways)

ii) ${}_7P_5 = 2520$ (ways)

iii) $3({}_8P_5) + 4({}_7P_5) = 3 \times 6720 + 4 \times 2520$
$= 30240$ (ways)

iv) ${}_7P_5 = 2520$ (ways).