



Combinations Ex 17.1 Q20(ii)

$$\begin{aligned}
 & n \times {}^{n-1}C_{r-1} \\
 &= n \times \frac{(n-1)!}{(r-1)![(n-1)-(r-1)]!} \\
 &= \frac{n! \times (n-r+1)}{(r-1)!(n-r)!(n-r+1)}
 \end{aligned}$$

multiplying numerator and denominator by  $(n-r+1)$

$$\begin{aligned}
 &= \frac{(n-r+1) \times n!}{(r-1)!(n-r+1)!} \\
 &= (n-r+1) {}^nC_{r-1}
 \end{aligned}$$

Hence Proved

Combinations Ex 17.1 Q20(iii)

$$\begin{aligned}
 {}^nC_r &= \frac{n!}{r!(n-r)!} \\
 {}^{n-1}C_{r-1} &= \frac{(n-1)!}{(r-1)!(n-1)-(r-1)!} \\
 \text{Or } \frac{{}^nC_r}{{}^{n-1}C_{r-1}} &= \frac{n!(r-1)!(n-r)!}{r!(n-r)!(n-1)!} \\
 &= \frac{n \times (n-1)!(r-1)! \times (n-r)!}{r \times (n-1)! \times (r-1)! \times (n-r)!} \\
 &= \frac{n}{r}
 \end{aligned}$$

Hence Proved

Combinations Ex 17.1 Q20(iv)

$$\text{L.H.S} \Rightarrow {}^nC_r + 2 {}^nC_{r-1} + {}^nC_{r-2}$$

$$= \left( {}^nC_r + {}^nC_{r-1} \right) + \left( {}^nC_{r-2} + {}^nC_{r-1} \right)$$

$$= {}^{n+1}C_r + {}^{n+1}C_{r-1} \quad \left[ \because {}^nC_r + {}^nC_{r-1} = {}^{n+1}C_r \right]$$

$$= (n+1) + {}^1C_r$$

$$= {}^{n+2}C_r$$

\*\*\*\*\* END \*\*\*\*\*