5.) If the 21^{st} and 22^{nd} terms in the expansion of $(1-x)^{44}$ are equal, then find the value of x.

Solution: $T_{22} = T_{21} \Rightarrow {}^{44}C_{21}(-x)^{21} = {}^{44}C_{20}(-x)^{20}$

$$\therefore \frac{{}^{44}C_{21}}{{}^{44}C_{20}} = \frac{1}{-x} \quad \text{or} \quad \frac{{}^{n}C_{r}}{{}^{n}C_{r-1}} = -\frac{1}{x} = \frac{n-r+1}{r}$$

Put $n=44$, $r=21$

$$\therefore -\frac{1}{x} = \frac{44-21+1}{21} = \frac{24}{21} = \frac{8}{7}$$

$$\therefore x = -\frac{7}{8}$$