$$\binom{n}{j} j \overset{?}{=} \binom{n}{j-1}(n-j+1)$$

$$\frac{n!}{j!(n-j)!}\, j \qquad \frac{n!}{(j-1)!(n-j+1)!}(n-j+1)$$

$$\geq$$

$$\frac{n!}{(j-1)!(n-j)!}$$

$$\frac{\partial}{\partial x}\left(\frac{x}{x+y}\right) = \frac{1}{x+y} - \frac{x}{(x+y)^2}$$

$$= \frac{x+y-x}{(x+y)^2} = \frac{y}{(x+y)^2}$$