$(1+a)^k \geq 1+ka$

$(1+a)^k(1+a) \geq (1+ka)(1+a)$

$(1+a)^{k+1} \geq 1+(k+1)a + ka^2 \geq 1+(k+1)a$

$ka^2 \geq 0$ ↑ not an equality, but that's okay!

$n=4$.

WTS: $(1+a)^4 \geq 1+4a$

$$(1+a)^4 = \sum_{k=0}^{4} \binom{4}{k} 1^k a^{4-k}$$

$$= \binom{4}{0}a^4 + \binom{4}{1}a^3 + \binom{4}{2}a^2 + \binom{4}{3}a + \binom{4}{4}$$

$= 4a + 1$