Proof. Without loss of generality, $X = \{1, \ldots, k\}$. We have n possibilities to choose $f(1)$. After this, for $f(2)$ there remain $n-1$ possibilities, then $n-2$ possibilities for $f(3)$, and so on up to $f(k)$, for which $n-(k-1) = n-k+1$ possibilities remain.
The above argument works for $k \leq n$, but the formula is true for $k > n$ as well: there are no injective maps in this case, and the product $n(n-1)\cdots(n-k+1)$ vanishes because it contains a zero factor. $\square$