vertices is $\frac{n(n-1)}{2}$

Proof:- This easy to proof by Mathematical induction

if $n=1$, 0 edges are reqd.

& $\frac{1(1-1)}{2} = 0$

If $n=2$, 1 edge is reqd.

& $\frac{2(2-1)}{2} = 1$

✓ Assume that a complete graph with K vertices has $\frac{K(K-1)}{2}$ when we add the (K+1) vertices we need to connect it to the K^{th} original vertices, requiring k, additional edges. We will then have

$\frac{K(K-1)}{2} + K = \frac{K(K-1)+2K}{2} = \frac{K^2+K}{2}$

$\frac{K(K+1)}{2} = \frac{(K+1)(K+1-1)}{2}$ vertices. Therefore the result is also true for K+1 vertices. Hence it is true for all +ve integer. Therefore the max no. of edges in a ~~simg~~ simple graph with n vertices is $\frac{n(n-1)}{2}$.