$f = 100n + 5 = O(n)$ ✓ $f \leq cg$

$= O(n^2)$ ✗

$100n + 5 \leq 100n + 5n = 105n$ ✓

$105n$: c, g

$c = 105$, $n_0 > 0$ $\Rightarrow 100n+5 = O(n)$

$100n + 5 \leq 100n + 5n = 105n \leq 105n^2$

$100n + 5 = O(n^2)$

Prove $\frac{1}{2}n(n-1) = \Theta(n^2)$

$\Leftarrow$

$\frac{1}{2}n(n-1) \in \Omega(n^2)$

$\frac{1}{2}n(n-1) \geq c_2 n^2$

$\frac{1}{2}n^2 - \frac{1}{2}n \geq \frac{1}{2}n^2 - \frac{1}{4}n^2$

$\geq \frac{1}{4}n^2$

c_2

$\frac{1}{2}n(n-1) \in O(n^2)$

$\frac{1}{2}n(n-1) \overset{??}{\leq} c_1 n^2$

$\frac{1}{2}n^2 - \frac{1}{2}n \leq \frac{1}{2}n^2$

c

$n_0 = 0$