a) The definition for $n^2 \in \Theta(\frac{n(n-1)}{2})$ indicates that there exists positive constants $c1$, $c2$, and n_0 such that for all $n > n_0$, n^2 is both bounded above and below by $c_1 \cdot (\frac{n(n-1)}{2})$ and $c_2 \cdot (\frac{n(n-1)}{2})$.

For $n^2 \in O(\frac{n(n-1)}{2})$, $n^2 = \frac{n}{2} \cdot 2n$ $\quad \frac{n(n-1)}{2} = \frac{n}{2} \cdot (n-1)$.

there exist $c_1 = 3$ and $n_0 = 3$ such that for all $n > n_0$, $2n \leq c_1 (n-1)$.

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

For $n^2 \in \Omega(\frac{n(n-1)}{2})$, $n^2 = n \cdot n$ $\quad \frac{n(n-1)}{2} = n(\frac{n-1}{2})$

there exist $c_2 = 1$ and $n_0 = 3$ such that for all $n > n_0$, $n \geq \frac{n-1}{2}$

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

We can conclude that $n^2 \in \Theta(\frac{n(n-1)}{2})$.

b) 0 5 1 4 3 2

0 1 5 4 3 2

c) 0 1 2 4 5 3.

d). 0 4 1 5 3 2.