

**Exercise 4.2.1::** What is the maximum number of edges in a digraph with  $V$  vertices and no parallel edges? What is the minimum number of edges in a digraph with  $V$  vertices, none of which are isolated?

**Solution:**

Recall for undirected graph with  $V$  vertices, there are  $\frac{V(V-1)}{2}$  edges. So 1 edge for both directions per node.

For digraph, we have two edges, 1 for each direction. Therefore, there are  $\frac{V(V-1)}{2} * 2 \equiv V(V-1)$  edges.

So  $V(V-1)$  max edges while min edge is 1