1. Consider the state diagram for the following DFA, M1

List the alphabet, start state, and accept state(s)

(2 points) \( \Sigma = \{0,1,2\} \)

(2 points) \( F = \{q_2\} \)

(4 points) What state do you end in if your input is 0101?

\[ q_0 \rightarrow q_0 \rightarrow q_1 \rightarrow q_0 \rightarrow q_1 \]

(6 points) What is the language of M1?

\( L = \{w \mid w \text{ ends in } 12\} \)
2. Define a machine to recognize the following language in the alphabet 
\( \Sigma = \{0,1,2\} \)
(5 points)
\( L_3 = \{w \mid w \text{ starts with a } 1 \text{ and ends with a } 1\} \)

3. Consider the graph \( G=(V,E) \)

(2.5 points) What is the degree of node D?

2

(2.5 points) What is a path from node A to node C?

\{\{(A,B), (B,C)\} \text{ or } \{(A,B), (B,D), (D,C)\}\}
4. Consider the following three languages
   \( A = \{ \text{dog, rabbit, zebra} \} \) \( B = \{ \text{red, pink} \} \) \( C = \{ \text{cold, warm} \} \)

Use set notation to list the strings that would be accepted for each of the operations below. (If there are an infinite number of strings, list 5-accepted strings and then use ellipses...)

(5 points) \( C \cup A \)

\{ \text{dog, rabbit, zebra, cold, warm} \}

(5 points) \( C \cdot B \)

\{ \text{coldred, coldpink, warmred, warmpink} \}