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

(2 points) What is the start state?
q2

(4 points) What is the cardinality of the power-set of all states:
|P(Q)| = 2^|Q| = 2^5 = 32

(4 points) What state do you end in if your input is baab?
q2->q3->q4 ----> q4

(4 points) What is the language of M1?
{w | w begins with a multiple-of-3 a’s followed by one b}
2. Define a machine to recognize the following language in the alphabet 
\[ \Sigma = \{0,1,\} \]
(5 points)
\[ L3 = \{ w \mid w \text{ contains at most one decimal point} \} \]

3. Draw a graph with six vertices/nodes where every vertex/node has the same number of degrees.
(4 points)

Example:

Provide the edges for a cycle in your graphs. If there are no cycles, say “no cycles”.
(The answer to this question depends on what graph you chose to draw above.)
(3 points)

For the example below, one answer is: \((1,2), (2,5), (5,6), (1,6)\)
4. Consider the following three languages
   \[ A = \{ \text{angry, happy, sad} \} \quad B = \{ \text{young, old} \} \quad C = \{ \text{teacher, student, robot, puppy} \} \]

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) \((A \cup B)^*\)

\[ \{ \varepsilon, \text{angry, happy, sad, young, old, angryold, youngsad, ...}, \text{happyoldsad, ...} \} \]

(5 points) \(C^*B^*C\)

\[ \{ \text{teacheryoungteacher, youngteacherstudent, ... studentoldrobot, studentoldpuppy, ... puppyoldpuppy} \} \]