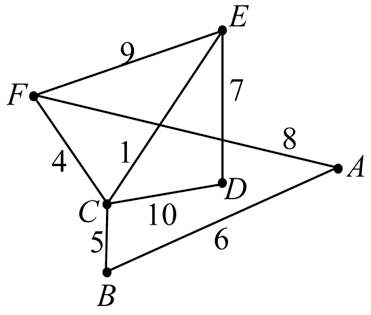
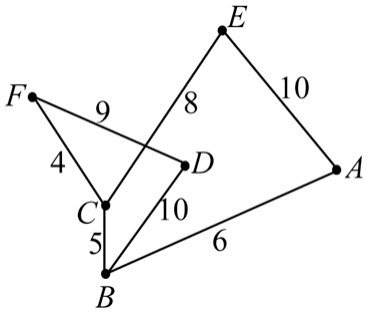
1. Draw a graph with the following:
   set of vertices: $\{v_1, v_2, v_3, v_4, v_5\}$
   set of edges: $\{e_1, e_2, e_3, e_4, e_5\}$
   edge-endpoint function:

edge	endpoints
e_1	$\{v_1\}$
e_2	$\{v_1, v_2\}$
e_3	$\{v_1, v_3\}$
e_4	$\{v_2, v_4\}$
e_5	$\{v_4, v_5\}$

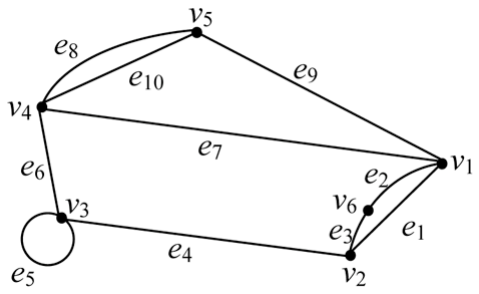
2. Use the given graph to find the minimum path weight from A to E.



3. Use the given graph to find the minimum path weight from A to F.



Use this graph.



4. List the vertices adjacent to v_1.

5. List all sets of parallel edges.

6. How can this graph be altered to make it a simple graph?

7. What is the degree of v_3?

8. What is the total degree of the graph?

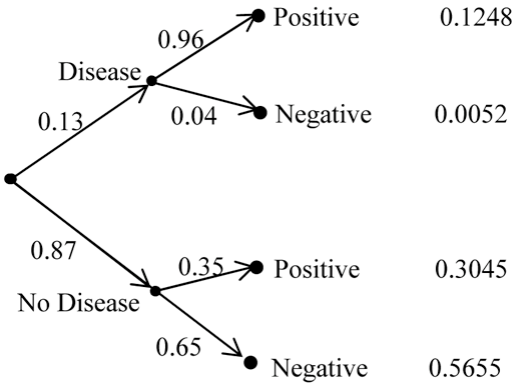
9. Starting at v_5, is the walk $e_9e_1e_3e_2e_7e_{10}e_8e_6e_5e_4$ a path?

10. Does there exist a graph with 8 vertices of degrees 2, 4, 5, 7, 9, 10, 12, and 14? If so, draw one. If not, explain why not.

11. Does there exist a graph with 6 vertices of degrees 2, 3, 4, 5, 7, and 8? If so, draw one. If not, explain why not.

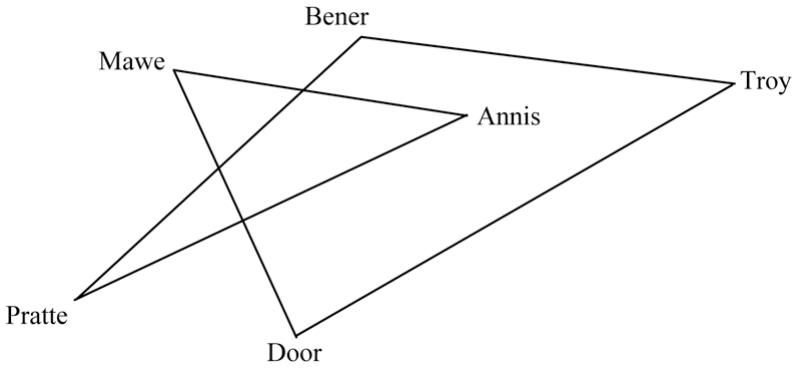
12. Early reports on a new test for prostate cancer suggest that the probability of a positive result if cancer is present is 80% and the probability of a negative result if cancer is not present is 75%. Suppose 30% of men taking the test actually have prostate cancer. Draw a graph and label its edges with probabilities to represent the situation.

13. Here is a graph of the probabilities of positive or negative results from a test for a certain disease. What is the probability that a person who tests negative actually has the disease?



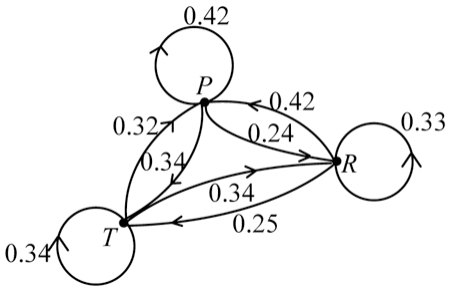
14. There are 45 new campers. The new campers are asked to each exchange T-shirts with 5 other new campers. Is this possible? Explain your answer.

15. Consider this graph of the routes between cities in Almir's sales territory. Is it possible for Almir to travel each route exactly once and end up where he started? Justify your answer.



16. Jerry tested a circular spinner divided into three congruent segments, colored red, green and blue. The pointer was always started at the middle of a segment by pushing a button. He discovered that, when starting on red, the pointer landed on red 34% of the time, on green 45% of the time, and on blue 21% of the time. Starting on green, the pointer landed on green 35% of the time, on blue 46% of the time, and on red 19% of the time. Starting on blue, the pointer landed on blue 34% of the time, on red 32% of the time, and on green 34% of the time. Draw a graph for this situation and label the edges with the correct probabilities.

17. Write the stochastic matrix that corresponds to this graph.



18. The matrix $\begin{matrix} & P & R & T \\ P & \\ R & \\ T & \end{matrix}\begin{bmatrix} 0.32 & 0.24 & 0.44 \\ 0.48 & 0.33 & 0.19 \\ 0.22 & 0.54 & 0.24 \end{bmatrix}$ represents the probabilities of a spinner that starts on purple, red, or tan landing on purple, red, or tan. Use a power of this matrix to find the probability that a random spin lands on tan.

Use the adjacency matrix $\begin{matrix} & v_1 & v_2 & v_3 & v_4 \\ v_1 & \\ v_2 & \\ v_3 & \\ v_4 & \end{matrix}\begin{bmatrix} 1 & 0 & 0 & 0 \\ 1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 \end{bmatrix}$.

19. Draw a digraph with this adjacency matrix.

20. How many walks of length 5 from v_4 to v_1 are there in the graph?