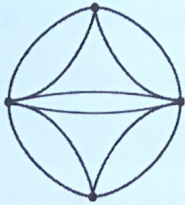
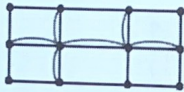


20.

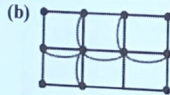


22. (a) Pothole inspection or inspecting the centerline for possible repainting because it had faded.
 (b) Street sweeping, snow removal, and curb inspections in urban areas.

23.



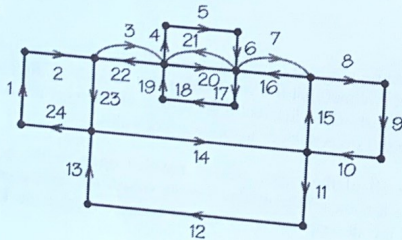
24. (a) The graph is a rectangular network with two rows and three columns. No extra edges need to be added.



25. (a) The largest number of such paths is 3. One set of such paths is AHF , $ABEF$, and $AGCF$.
 (b) This task is simplified by noticing there are many symmetries in this graph. You may notice that starting with A , there are only three directions to go. Any number of paths greater than 3 would involve repeating an edge starting from A .
 (c) In a communication system such a graph offers redundant ways to get messages between pairs of points even when the failure of some of the communication links (edges removed) occurs.

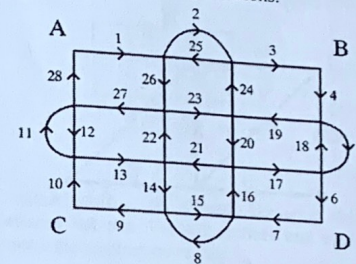
26. Both are circuits; however, only graph (b) is an Euler circuit.
 27. Do not choose edge 2, but edges 1 or 10 could be chosen.
 28. Do not choose edge 3, but edges 9 or 10 could be chosen.

29.



21. There is such an efficient route. The appropriate graph model has an additional edge joining the same pair of vertices for each of the edges shown in the graph of Exercise 19. Since this graph is connected and even-valent, it has an Euler circuit, any one of which will provide a route for the snowplow. Routes without 180-degree turns are better choices.

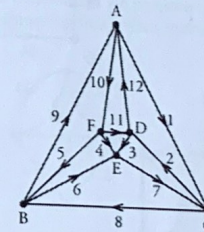
30. (a) The following diagram shows one of many solutions.



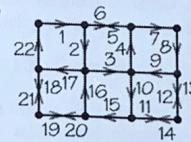
- (b) Answers will vary; there are many Euler circuits in the graph.

31. Two edges need to be dropped to produce a graph with an Euler circuit. Persons who parked along these stretches of sidewalk without putting coins in the meters would not need to fear that they would get tickets.

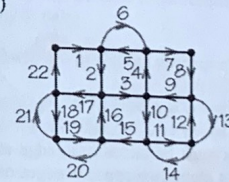
32. If one was outlining garden plots with a sprinkler hose, this tour would allow having the hoses as flat as possible because one hose would not have to cross another hose.



33. (a)



(b)



- No. Five is the minimum number of edges that must be reused. Fewer than 5 reused edges cannot be achieved.