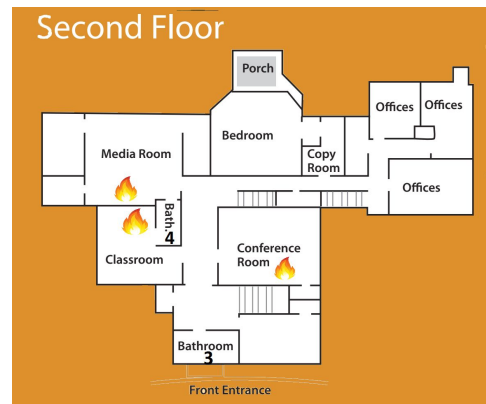
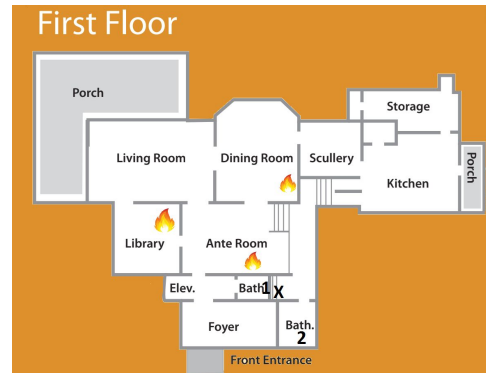
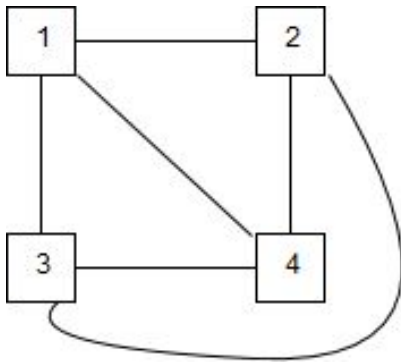


## Fireplace Efficiency

At the Desmond Campus main building, there are 4 bathrooms, 2 on each floor. When these bathrooms must be cleaned, the housekeeping staff wants to be as efficient as possible to save time and energy. Suppose that it takes the staff member 30 seconds to climb a flight of stairs, and 15 seconds to walk through a hallway or a room. The following graph can be used to represent all of the possible routes.



Each location is represented on the graph by a *vertex*. Each of these vertices is connected with a line, representing the connection between two bathrooms. Each *edge* is labeled with how much time it takes to move from one bathroom to another, in seconds.

This problem is an example of the famous “Postman Problem,” where the goal was for the postman to visit every location in the shortest amount of time. Using the graph above and the space below, find the most efficient route to visit every bathroom.

How much time does it take?

Graphs of this form are easier to draw when there are fewer vertices. Because there are only 4 bathrooms, the graph above is relatively simple.

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The Desmond Campus also has 6 fireplaces. The campus facilities crew do nightly checks on the fireplaces to make sure that everything is safe and operating correctly. Using the floor chart you have been provided, find the location for the 3 fireplaces on the first floor, and create a graph similar to the one shown above for the 1st floor. We can assume that it takes the same amount of time for the workers to travel through hallways and up and down staircases as before.

Suppose that the staircase labeled “X” had become damaged to the point that the facilities staff was no longer able to use it. Would this increase the total time, or would it stay the same?

Create a new graph to support your answer in the space below.

Using the graph you created, find two different possible routes that start on the first floor and visit every fireplace. Find the most efficient route, and show how much time is saved.