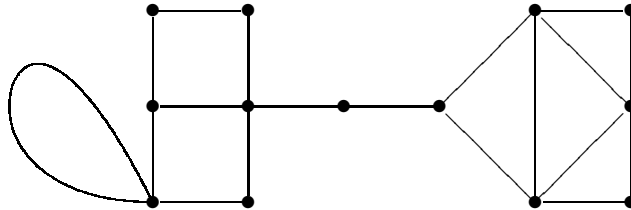


1. (8 points) Place the following labels on the graph below.

(a) (3 points) Place a  $\triangle$  on each vertex of odd degree.

(b) (3 points) Place a  $\bigcirc$  on each bridge.

(c) (2 points) Place a  $\checkmark$  next to each loop.



2. (10 points, 2 each) True or false. Circle the correct answer, no justification.

T F A graph can have exactly 3 vertices of odd degree.

T F When you are counting the degree of a vertex, loops only count for 1.

T F If a graph has more than 2 vertices of odd degree, it has no Euler path.

T F Adding loops has no effect on whether a graph has an Euler circuit.

T F Every graph with no vertices of odd degree has an Euler circuit.

3. (7 points) Only 5 of the original 7 bridges of Königsberg are still in place. There are still 2 banks (top and bottom) and 2 islands (left and right), but now each bank has exactly one bridge to each island and the islands have one bridge between them.

(a) (3 points) Draw a graph representing this situation.

(b) (2 points) Describe an Euler path in this graph.

(c) (2 points) Give a short reason why this Euler path is impractical for tourists.