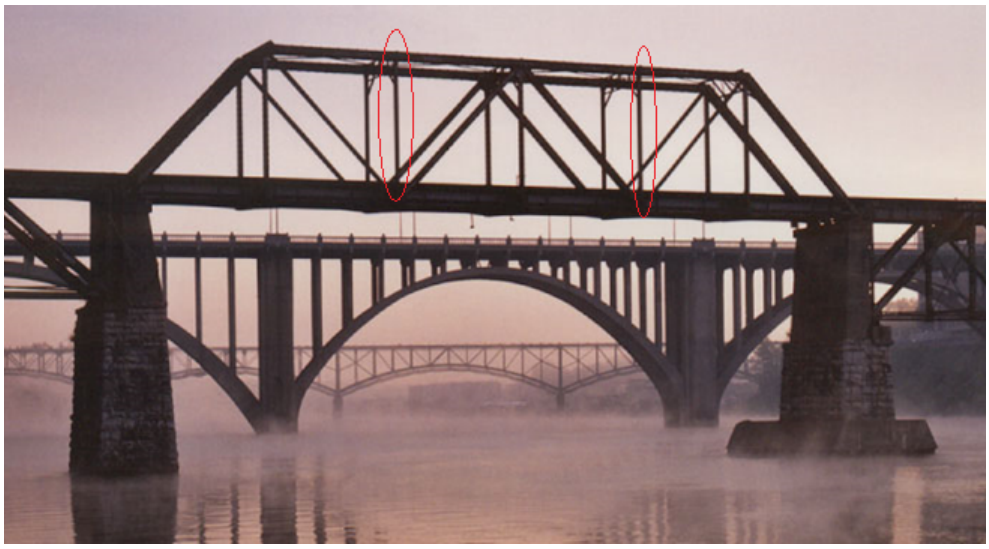
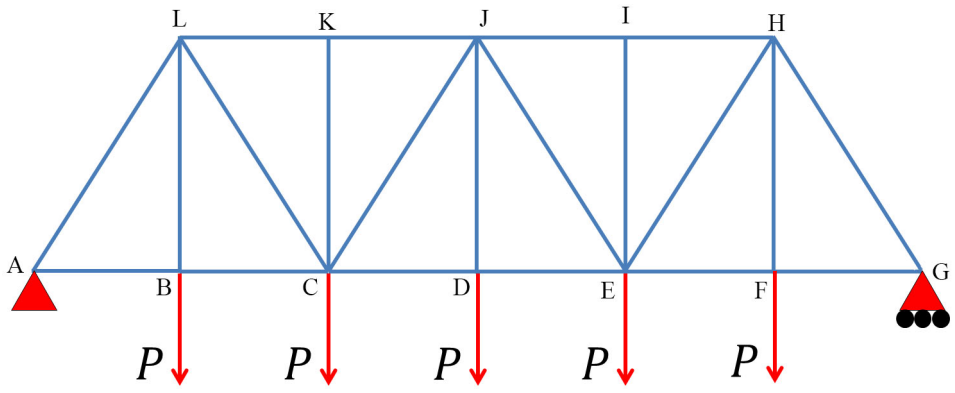
Name: _____

TAM 210/211 Written Assignment 7 (due on March 3rd)

Consider the bridge below (Figure 1), where all vertical and horizontal members have a fixed length a, with a vertical load P at each of the joints in the support along the deck as shown below (Figure 2). All the dimensions are in SI



This load P corresponds to the load from the deck. For everything ahead, we will simplify the problem by considering it in 2D. Figure 2 (*not to scale*) below models the supporting side truss of the bridge.



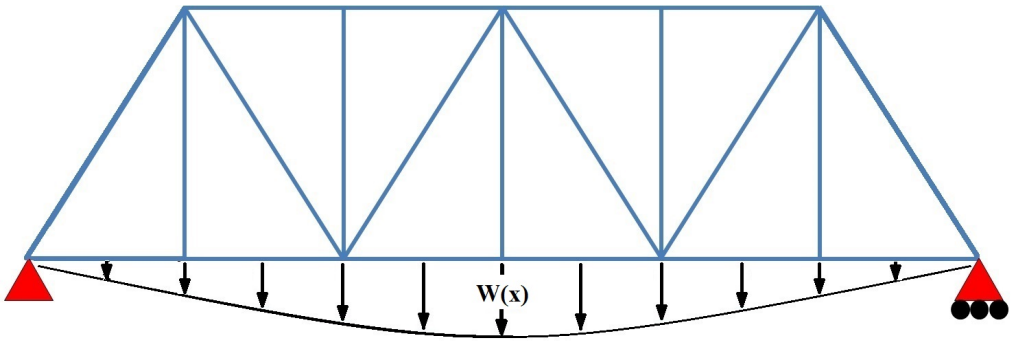
a) Draw a free body diagram of the truss and obtain expressions for the external reaction forces at A and G as a function of P and a.

b) Identify all zero-force members.

c) Use the method of joints to find the internal forces in each truss member (indicating if it is compressive or tensile). Draw the appropriate free body diagrams of the joints you chose to analyze.
Hint: the truss has symmetric geometry and symmetric loading.

d) Take a look again at the picture of the bridge (Figure 1). Do you see anything different in the picture when comparing tensile vs. compressive members? Are all members the same size? Explain.

e) What would happen if you remove the two circled truss members from the bridge in Figure 1? Explain.



f) The above truss has the same dimesions as the previous with a distributed load given by $W(x) = \frac{100x}{a}\left(\frac{x}{a} - 6\right)$. Obtain expressions for the external forces at A&G as a function of a. Analyze how the distributed load change the system.