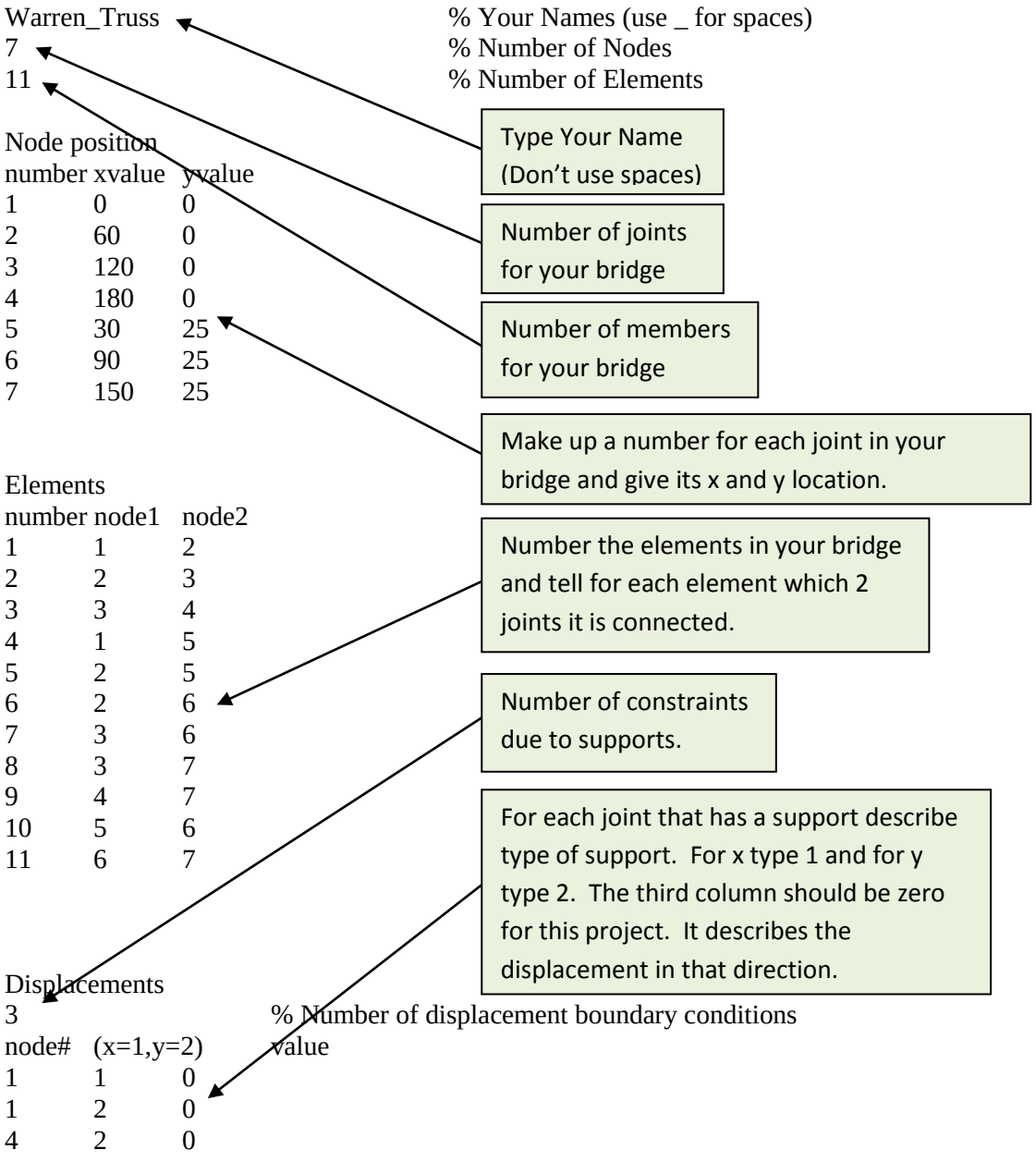
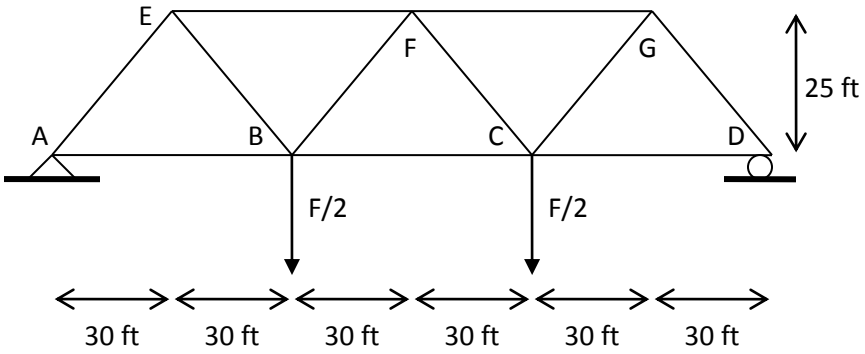
Statics Final Project
Truss Design Competition
Computer Program Manual

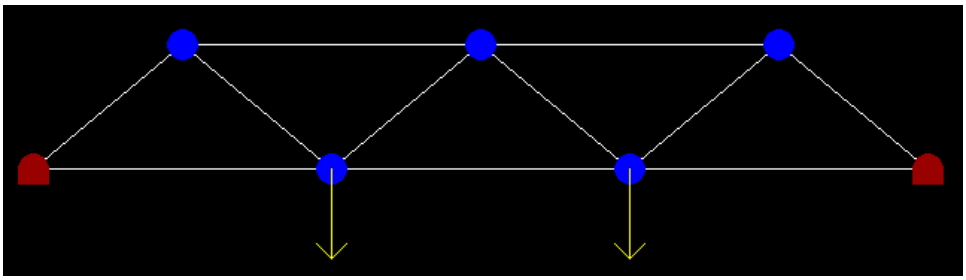
The program that has been generated provides you the ability to solve for the internal forces inside the truss and find the maximum load automatically. Everything for setting up each calculation is done in the **input.txt** file. The sample version of this text that came with the computer program is shown below.



This input file creates a bridge that looks like

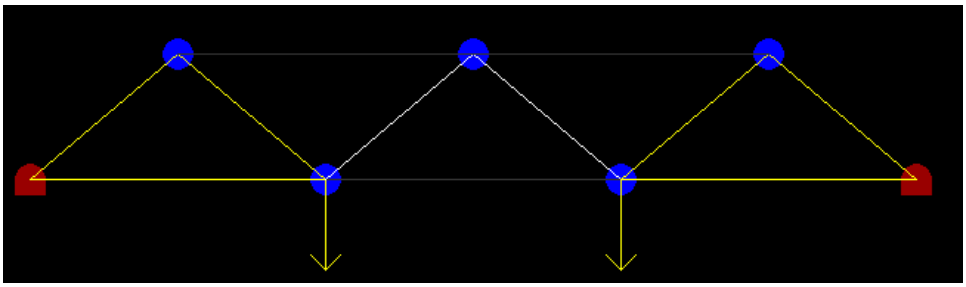


and when the code is executed the screen displays



The blue dots are the joints. The yellow arrows are the forces. The red dots are where there is some type of support. The white lines are the members.

When you hit the enter key, the bridge is loaded and the members will change colors. When the internal resultant force in a member reaches 48,000 lbs it changes blue. When it reaches 98,000, it changes green. At 248,000, it is yellow. At 348,000, it is red. At 448,000, it becomes dark red. At 500,000, it turns dark grey denoting it broke.



In this design, the horizontal members near the center all broke at the same time. The two angled members at the center of the truss actually did not do anything. However, they were needed to keep the bridge from moving (degrees of freedom). At the upper left corner of the screen the computer program calculates the maximum load for the structure, the total length of the structure, and also the efficiency number. Remember a high efficiency number is the goal of your final design.

All of the values for each calculation are written to the **output.txt** file. Below is a sample copy from the previous run.

Maximum Total Load of Bridge
416666

External forces

node#	Xreaction	Yreaction
1	0.0000E+00	0.0000E+00
2	0.0000E+00	2.0833E+05
3	0.0000E+00	2.0833E+05
4	0.0000E+00	0.0000E+00
5	0.0000E+00	0.0000E+00
6	0.0000E+00	0.0000E+00
7	0.0000E+00	0.0000E+00

Shows the forces applied to the bridge at maximum loading.

Reaction forces

node#	Xreaction	Yreaction
1	1.8948E-10	2.0833E+05
2	-3.7896E-10	3.7896E-10
3	0.0000E+00	5.6843E-10
4	-1.8948E-10	2.0833E+05
5	9.4739E-11	0.0000E+00
6	1.5721E-11	-7.5791E-10
7	1.2118E-10	0.0000E+00

Shows reaction forces calculated in the bridge.

Internal Forces

elem#	Internal force
1	2.5000E+05
2	5.0000E+05
3	2.5000E+05
4	-3.2543E+05
5	3.2543E+05
6	3.7917E-11
7	-2.2750E-10
8	3.2543E+05
9	-3.2543E+05
10	-5.0000E+05
11	-5.0000E+05

Shows internal forces calculated throughout the bridge.

Total Length of elements
534.31

Efficiency Number
779.82

I hope you enjoy using the program and will find this helpful in learning about bridges.