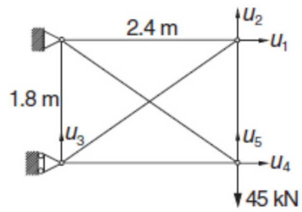
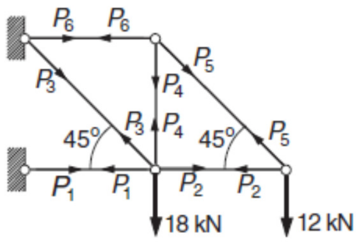
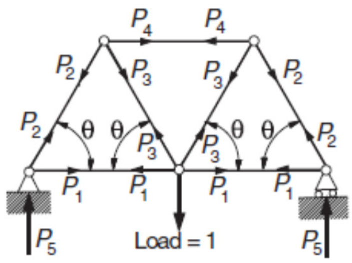
Project

Due Date: 2/6/2016

Level 1: Maximum Possible Grade 10

Submittals: MatLab File – Snapshots of Solution – Comparison with SAP2000 Solution for Level 1 Projects including Finite Element Analysis – Graphs showing deformations.

Project Number	Description
1	Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:  Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.
2	Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:  Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.
3	Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:  Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.

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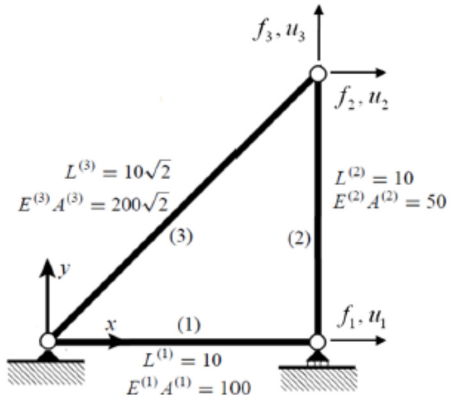
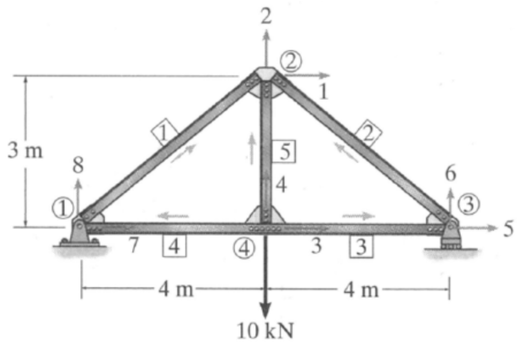
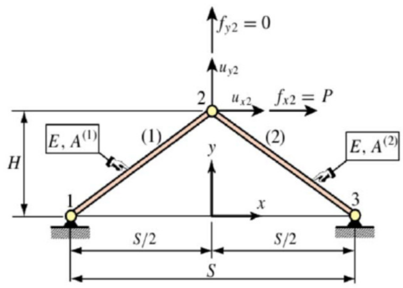
<tr><th>Project Number</th><th>Description</th></tr>
<tr><td>4</td><td>Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:



Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.</td></tr>
<tr><td>5</td><td>Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:



Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.</td></tr>
<tr><td>6</td><td>Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:



Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member. (S=5m, H=3m)</td></tr>
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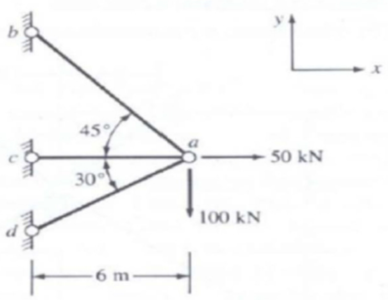
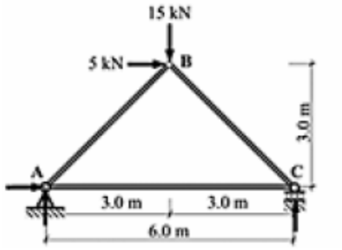
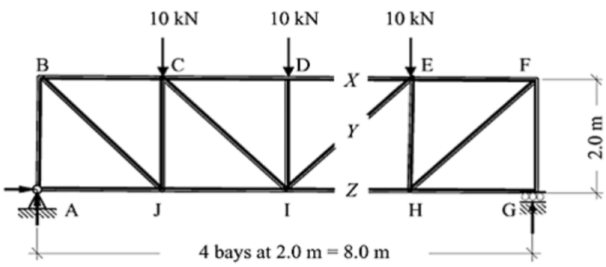
7	Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:  Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.
8	Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:  Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.
9	Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:  Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.

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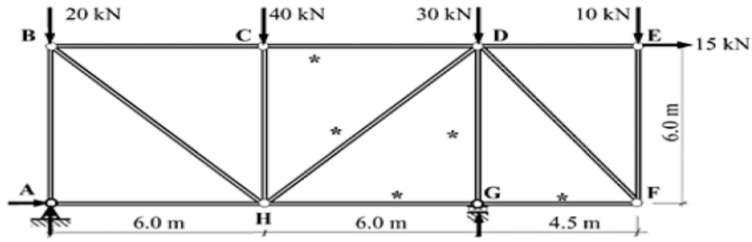
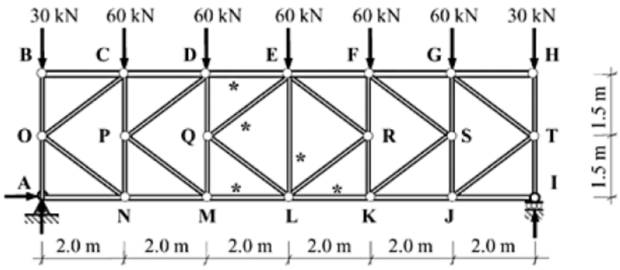
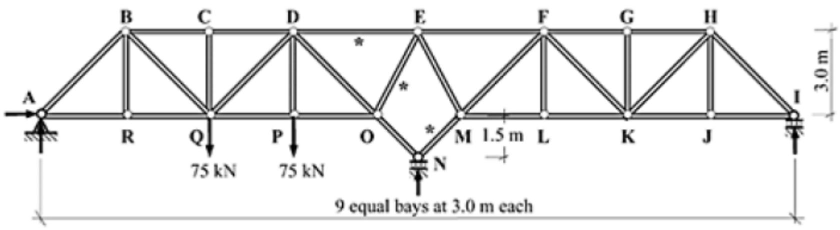
10	Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:  Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.
11	Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:  Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.
12	Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:  Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.

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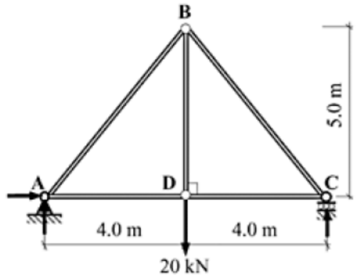
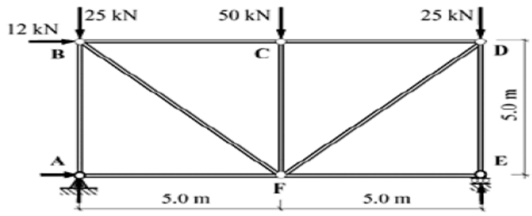
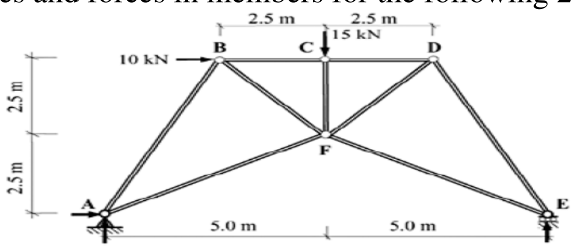
13	Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:  Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.
14	Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:  Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.
15	Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:  Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.

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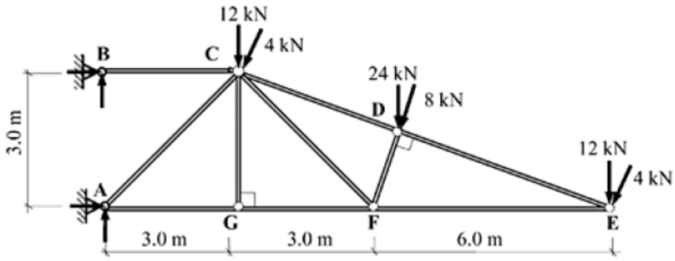
<tr><td>16</td><td>Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:


Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.</td></tr>
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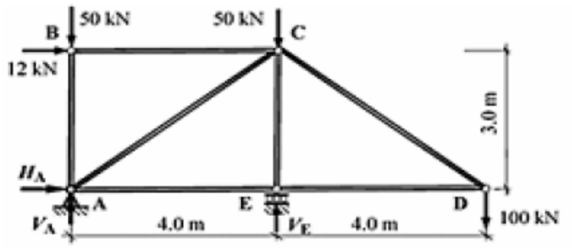

Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.</td></tr>
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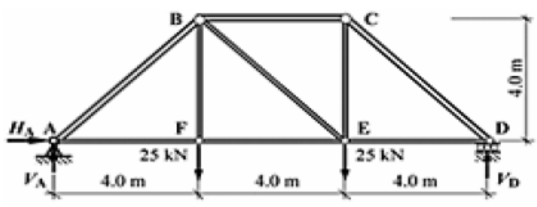

Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.</td></tr>
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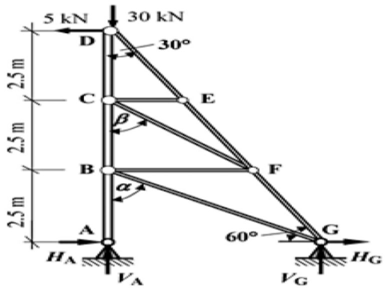
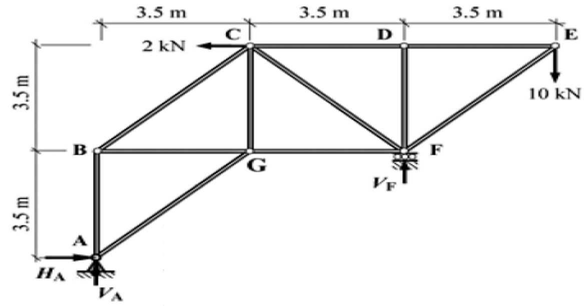
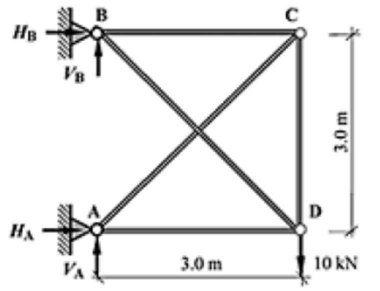
19	Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:  Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.
20	Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:  Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.
21	Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:  Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.

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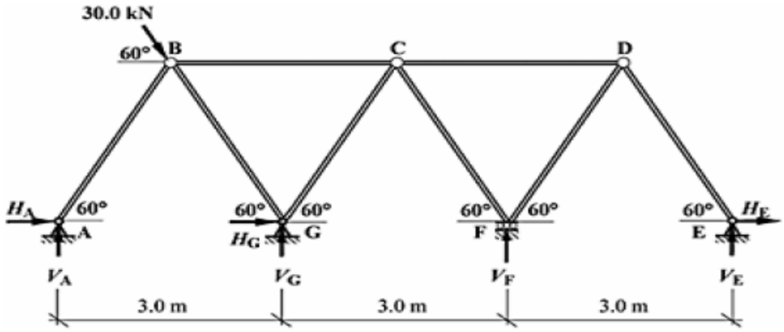
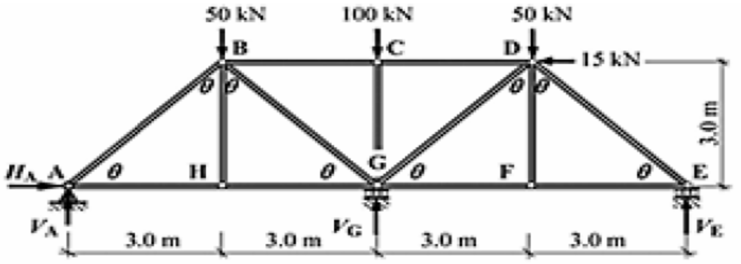
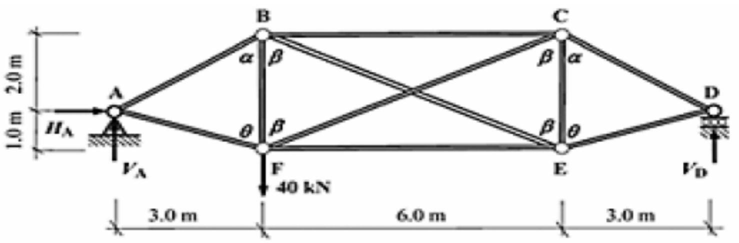
22	Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:  Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.
23	Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:  Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.
24	Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:  Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.

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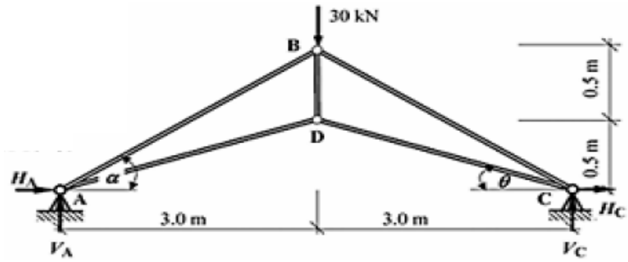
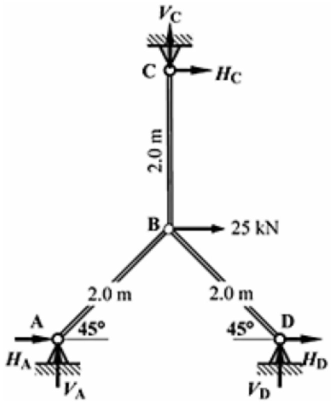
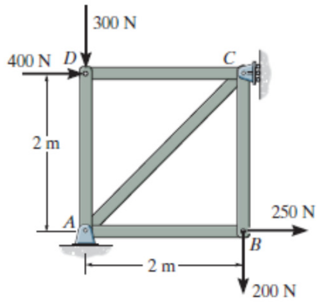
25	Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:  Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.
26	Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:  Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.
27	Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:  Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.

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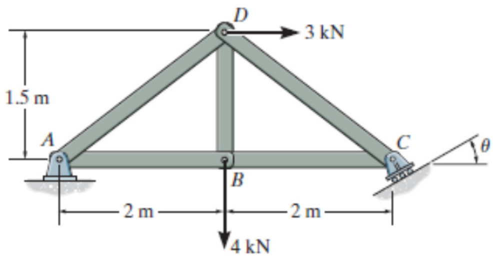

Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member. ($\Theta = 30^{o}$)
</td></tr>
<tr><td>29</td><td>
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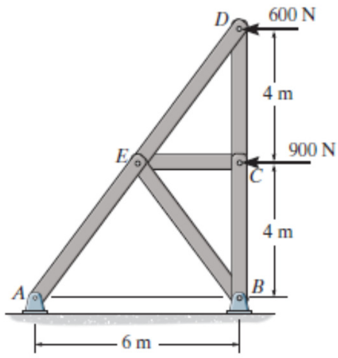

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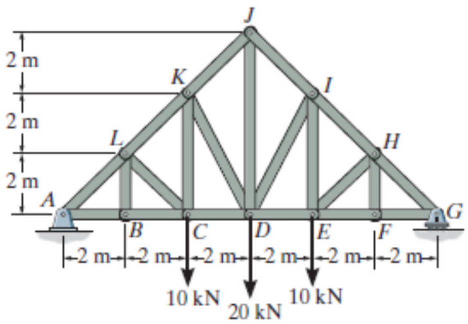

Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.
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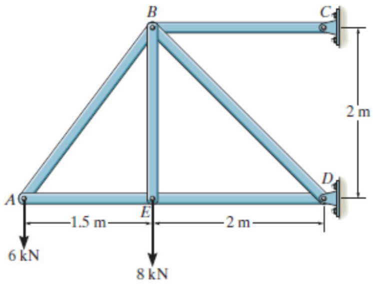

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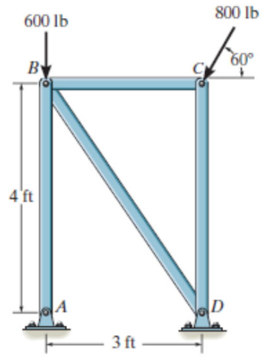

Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.</td></tr>
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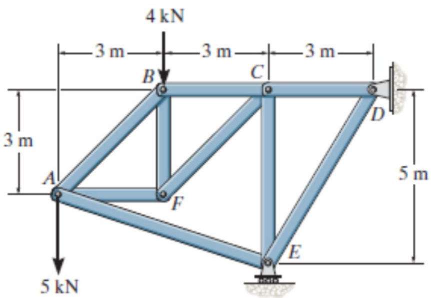

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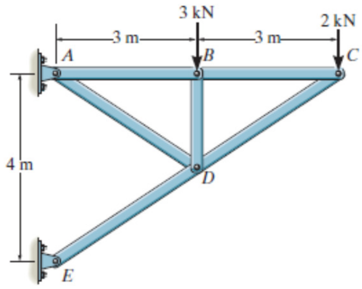
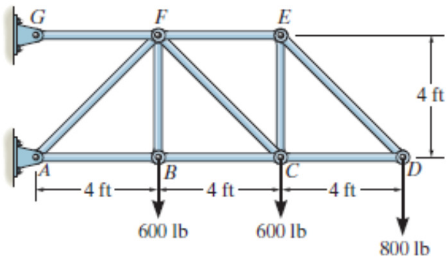
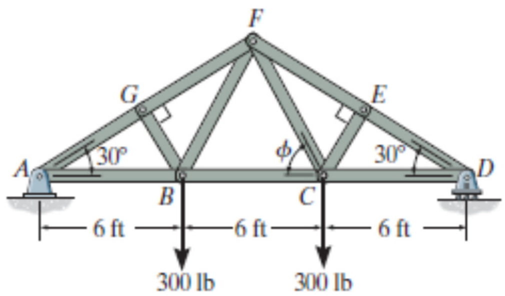
34	Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:  Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.
35	Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:  Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.
36	Develop a MatLAB program that can determine the displacements at different nodes and forces in members for the following 2-D truss:  Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.

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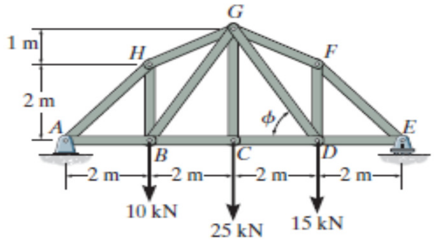

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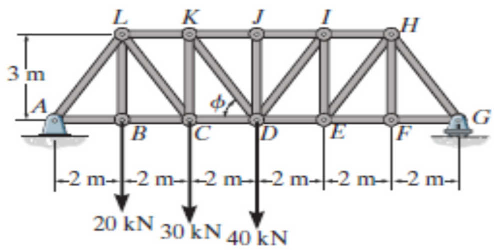

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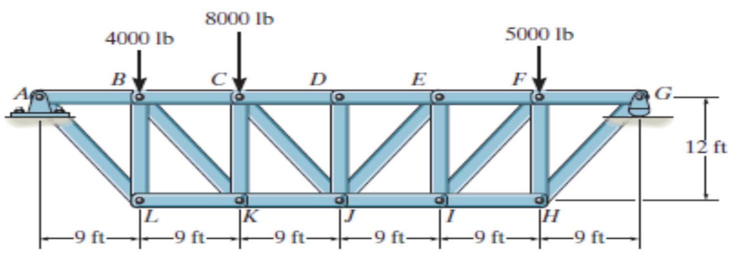

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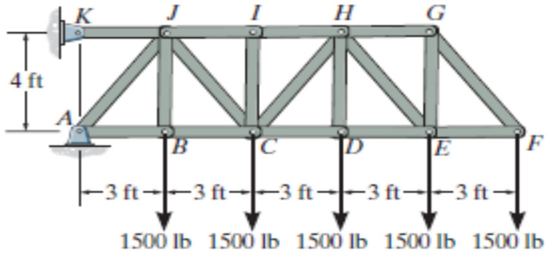

Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.</td></tr>
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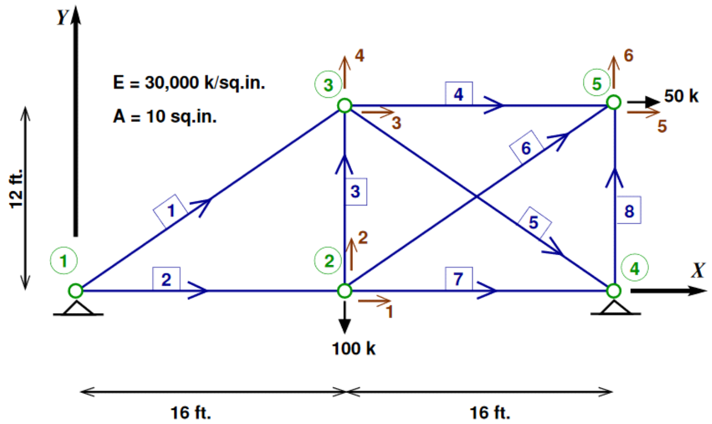

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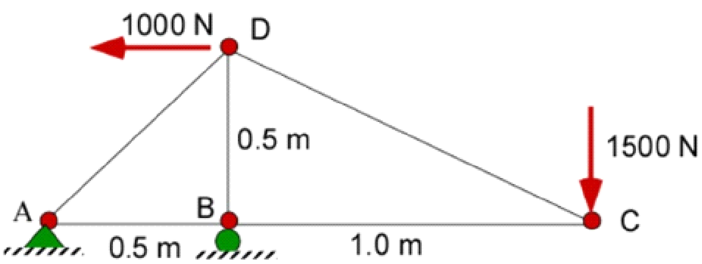

Stiffnesses of the members are k = EA/L where E is the modulus of elasticity, A represents the cross sectional area and L is the length of the member.</td></tr>
</table>

Level 2: Maximum Possible Grade 7

Submittals: MatLab File – Snapshots of Solution – Comparison with MatLAB Built-in function solution.

Project Number	Description
1	Develop a MatLAB program that can solve a system of linear algebraic equations (5 equations) using an iterative method.
2	Develop a MatLAB program that can decompose a matrix using Choleski's decomposition method and compare the efficiency of your solution with the built-in function.
3	Develop a MatLAB program that can decompose a matrix using Doolittle's decomposition method and compare the efficiency of your solution with the built-in function.
4	Develop a MatLAB program that can determine the determinant of a matrix and compare the efficiency of your solution with the built-in function.
5	Develop a MatLAB program that can solve a system of linear algebraic equations using Gauss Elimination method.
6	Develop a MatLAB program that can determine the inverse of a matrix using LU decomposition with pivoting. (Do not use the built-in LU decomposition function)
7	Develop a MatLAB program that can determine the eigen values and the eigen vectors for a matrix using iterative method and compare the efficiency of your solution with the built-in function.
8	Develop a MatLAB program that can determine the roots for the nonlinear equation: using Newton-Raphson method. $f(x) = 3x^5 + 2x^2 + x - 10$ (Do not use the built-in function)
9	Develop a MatLAB program that can determine the roots for the nonlinear equation: using the bisection method. $f(x) = 3x^5 + 2x^2 + x - 10$ (Do not use the built-in function)
10	Develop a MatLAB program that can determine the roots for the nonlinear equation: using the false position method. $f(x) = 3x^5 + 2x^2 + x - 10$ (Do not use the built-in function)
11	Develop a MatLAB program that can determine the roots for the nonlinear equation: using Newton-Raphson method. $f(x) = x - \cos(x)$ (Do not use the built-in function)
12	Develop a MatLAB program that can determine the roots for the nonlinear equation: using the bisection method. $f(x) = x - \cos(x)$ (Do not use the built-in function)

Project Number	Description
13	Develop a MatLAB program that can determine the roots for the nonlinear equation: using the false position method. $f(x) = x - \cos(x)$ (Do not use the built-in function)
14	Develop a MatLAB program that can determine the roots for the nonlinear equation: using Newton-Raphson method. $f(x) = x^2-3\sin(x)+2$ (Do not use the built-in function)
15	Develop a MatLAB program that can determine the roots for the nonlinear equation: using the bisection method. $f(x) = x^2-3\sin(x)+2$ (Do not use the built-in function)
16	Develop a MatLAB program that can determine the roots for the nonlinear equation: using the false position method. $f(x) = x^2-3\sin(x)+2$ (Do not use the built-in function)
17	Develop a MatLAB program that can determine the roots for the nonlinear equation: using Newton-Raphson method. $x.\cosh(50/x)=x+10$ (Do not use the built-in function)
18	Develop a MatLAB program that can determine the roots for the nonlinear equation: using the bisection method. $x.\cosh(50/x)=x+10$ (Do not use the built-in function)
19	Develop a MatLAB program that can determine the roots for the nonlinear equation: using the false position method. $x.\cosh(50/x)=x+10$ (Do not use the built-in function)
20	Develop a MatLAB program that can search for the minimum value for: $F(x) = 2 - e^{-(x-5)^2}$ Using Fibonacci Method. (Do not use the built-in function)
21	Develop a MatLAB program that can search for the minimum value for: $F(x) = 2 - e^{-(x-5)^2}$ Using Newton Method. (Do not use the built-in function)
22	Develop a MatLAB program that can search for the maximum value for: $F(x) = 2.\sin(x) - x^2/10$ Using Fibonacci Method. (Do not use the built-in function)

Project Number	Description
23	Develop a MatLAB program that can search for the maximum value for: $F(x) = 2.\sin(x) - x^2/10$ Using Newton Method. (Do not use the built-in function)
24	Develop a MatLAB program that can search for the maximum value for: $F(x) = -x^2 + 8x$ Using Fibonacci Method. (Do not use the built-in function)
25	Develop a MatLAB program that can search for the maximum value for: $F(x) = -x^2 + 8x$ Using Newton Method. (Do not use the built-in function)
26	Develop a MatLAB program that can search for the maximum value for: $F(x) = x^3 - 6x^2 + 9x$ Using Fibonacci Method. (Do not use the built-in function)
27	Develop a MatLAB program that can search for the maximum value for: $F(x) = x^3 - 6x^2 + 9x$ Using Newton Method. (Do not use the built-in function)