Classical Methods of Structural Analysis
Quiz for Session 3: Deflections By Virtual Work – June 24, 2019
Due: July 15, 8:00 a.m. EDT – Submit through the online form

AISC Night School

1. The method of virtual work for a truss permits the determination of deflection:
    a. only under a loaded point on the truss.
    b. at any node on the truss due to any loading.
    c. in any direction at any node due to any load.
    d. b and c.
    e. All of the above are true.

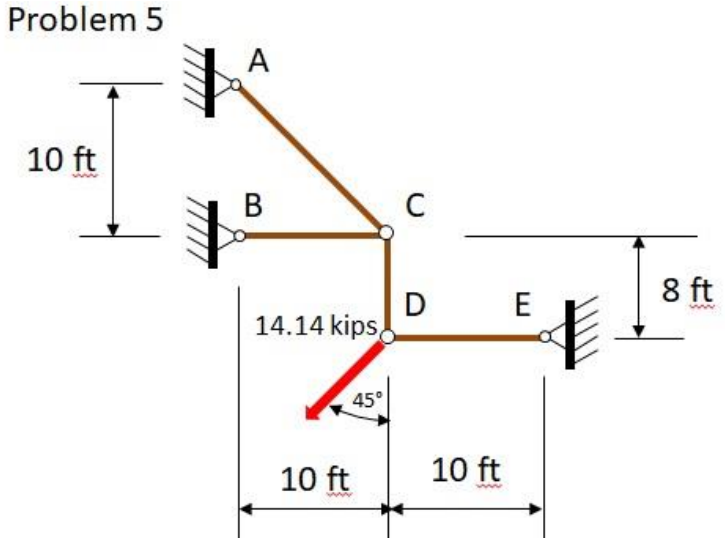
2. Expressions for virtual work do not include the ½ factor that is included in the real work expressions. This is because:
    a. the virtual load does work by moving through the entire real deflection.
    b. the area under the load displacement diagram for the virtual load is represented by a rectangle.
    c. the real deflection is one half the virtual deflection.
    d. a and b
    e. None of these are true.

3. When writing moment equations for a virtual work solution, *x* defines the range over which the moment equations are valid. Which of the following are true?
    a. *x* must always start at 0.
    b. *x* must always go in the same direction on a single member.
    c. *x* must be the same for the real moment equation, M_x, and the virtual moment equation, m_x.
    d. All of the above are true.
    e. None of these are true.

4. For a W-shape simple steel beam with uniform load, the shear contribution to deflection:
    a. cannot be more that 3.5% of the flexural deflection.
    b. will make a more significant contribution for low span-to-depth ratios.
    c. will be a greater percent of the flexural deflection for a W24x55 than for a W14x90.
    d. will be the same as for the same beam with a concentrated load.
    e. None of these are correct.

Classical Methods of Structural Analysis
Quiz for Session 3: Deflections By Virtual Work – June 24, 2019
Due: July 15, 8:00 a.m. EDT – Submit through the online form

Problem 5



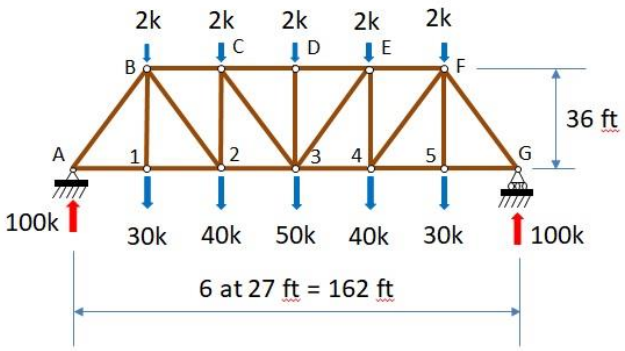
All members are 0.5 in.^{2} steel

5. For the structure given, determine the vertical deflection at D if all members have the same *E* and *A.*

a. 0.032 in. down
b. 0.032 in. up
c. 0.38 in. up
d. 0.38 in. down
e. None of the above

Classical Methods of Structural Analysis
Quiz for Session 3: Deflections By Virtual Work – June 24, 2019
Due: July 15, 8:00 a.m. EDT – Submit through the online form

Problem 6



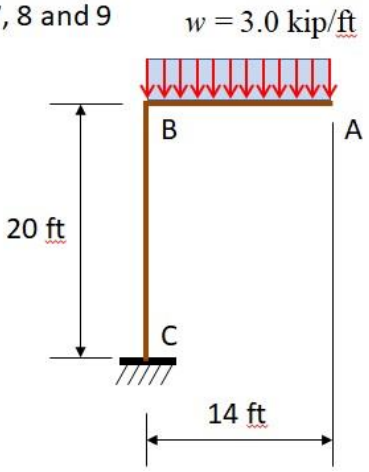
Member	Area, A, (in.^{2})
AB	6.0
BC	4.0
CD	5.0
DE	5.0
EF	4.0
FG	6.0
A1	3.0
12	3.0
23	5.0
34	5.0
45	3.0
5G	3.0
B1	2.0
C2	2.0
D3	2.0
E4	2.0
F5	2.0
B2	5.0
C3	5.0
E3	5.0
F4	5.0

6. For the given truss and loading considered in Lecture 3 and shown here, the approximate horizontal deflection at node 2 is:

a. 0.56 in. to right
b. 0.046 in. to right
c. 1.12 in. to right
d. 0.28 in. to right
e. none of the above

Classical Methods of Structural Analysis
Quiz for Session 3: Deflections By Virtual Work – June 24, 2019
Due: July 15, 8:00 a.m. EDT – Submit through the online form

Problem 7, 8 and 9



Material Steel
I_{AB} = 2000 in.^{4}
I_{BC} = 4000 in.^{4}

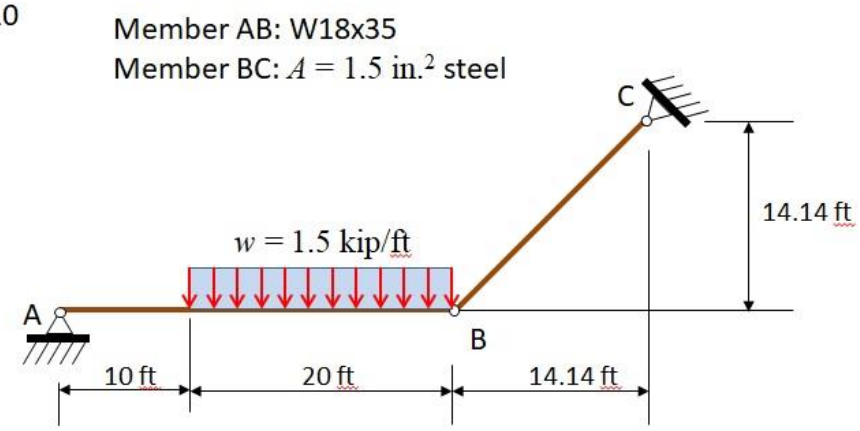
7. For the structure shown, the vertical deflection at A considering only flexure is approximately:
   a. 5.0 in.
   b. 6.0 in.
   c. 4.3 in.
   d. 1.7 in.
   e. None are correct

8. For the same structure as Problem 7, the horizontal deflection at A considering only flexure is approximately:
   a. 0.50 in.
   b. 0.90 in.
   c. 1.00 in.
   d. 1.25 in.
   e. None of the above

9. For the same structure as Problem 7, rotation at A considering only flexure is approximately:
   a. 0.35 rad.
   b. 0.72 rad.
   c. 0.53 rad.
   d. 0.011 rad.
   e. None of the above

Classical Methods of Structural Analysis
Quiz for Session 3: Deflections By Virtual Work – June 24, 2019
Due: July 15, 8:00 a.m. EDT – Submit through the online form

Problem 10



10. For the structure given, the vertical deflection at point B considering both axial and flexural contributions is approximately:

a. 0 in.
b. 0.24 in.
c. 0.48 in.
d. 0.72 in.
e. None of the above