

Unless otherwise mentioned, these problems should be solvable using a basic calculator. Practice clear communication by showing all work (free body diagrams, algebra, etc). This will be required to receive full credit on any graded problems.

1. Book problems:

(a) *Use process from section 7.2*

- i. 7.35
- ii. 7.45

(b) *Use process from section 7.3*

- i. 7.70
- ii. 7.78

Additional Practice Problems: 7.31, 7.34, 7.42, 7.72

The quiz problem will not be selected from these additional practice problems. However, these exercises contain important elements of the course and similar problems may appear on the exam.

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**Solution:**

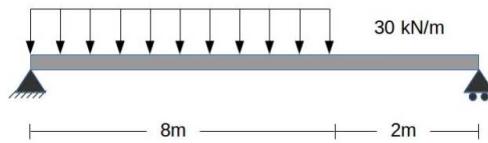
$$7.35 \quad |V|_{max} = 40.0 \text{ kN}, |M|_{max} = 55.0 \text{ kN} \cdot m$$

$$7.45 \quad |V|_{max} = 6.00 \text{ kips}, |M|_{max} = 12.0 \text{ kip} \cdot ft$$

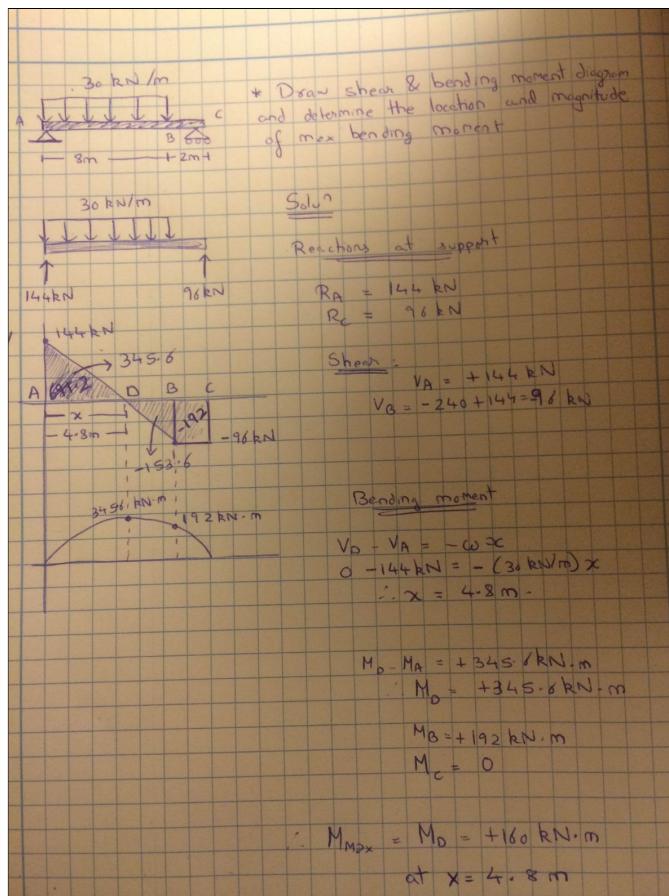
$$7.70 \quad |V|_{max} = 44.7 \text{ kN}, |M|_{max} = 35.3 \text{ kN} \cdot m$$

$$7.78 \quad 90.0 \text{ kN} \cdot m \text{ at B}$$

2. Draw the shear force and bending moment diagram for the following beam. Determine the location and the magnitude of the maximum bending moment.



**Solution:**

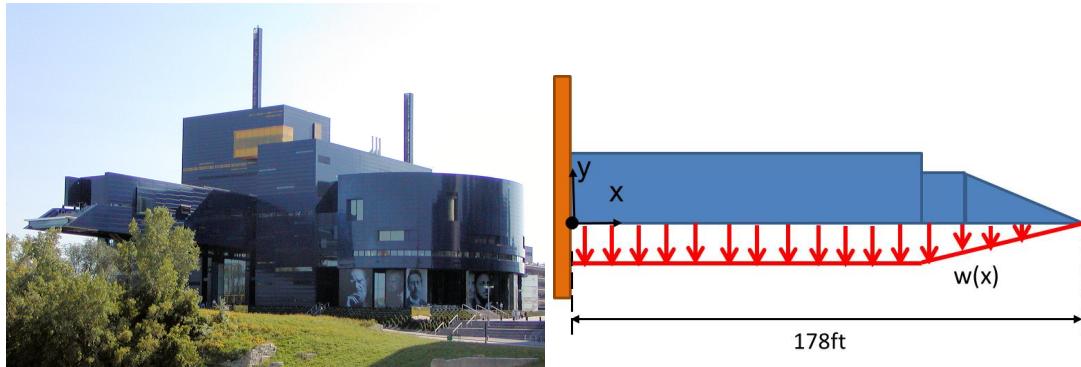


3. The Guthrie Theater, shown below (left), is located on the west bank of the Mississippi River. It includes a 178 foot bridge. Assume the bridge can be modeled as a cantilevered beam with the distributed load  $w(x)$  as shown below (right). The distributed load is given by

- $w(x) = w_0 \text{ lb/ft}$  for  $0 \leq x \leq 150 \text{ ft}$
- $w(x) = w_0 \frac{178-x}{28} \text{ lb/ft}$  for  $150 < x \leq 178 \text{ ft}$

Where  $w_0$  is a constant with the sign convention  $w_0 > 0$  corresponding to the distributed load acting in the  $-y$  direction as shown.

Draw the shear and bending moment diagrams for the bridge



### Solution:

