

### ARCH 614: Practice Quiz 4

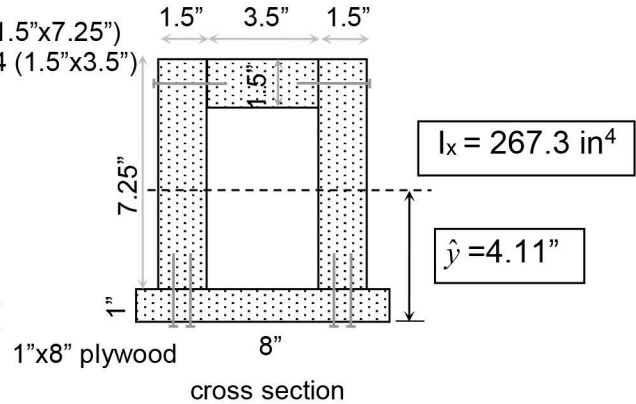
Note: No aids are allowed for part 1. One side of a letter sized paper with notes is allowed during part 2, along with a silent, **non-programmable** calculator. There are no reference charts for part 2.

Clearly show your work and answer. \_\_\_\_\_

Part 1) Worth 5 points  
(conceptual questions)

Part 2) Worth 45 points

(NOTE: The dimensions, sizes and connectors *can and will* be changed for the quiz! The shape will still consist of four timber members.)

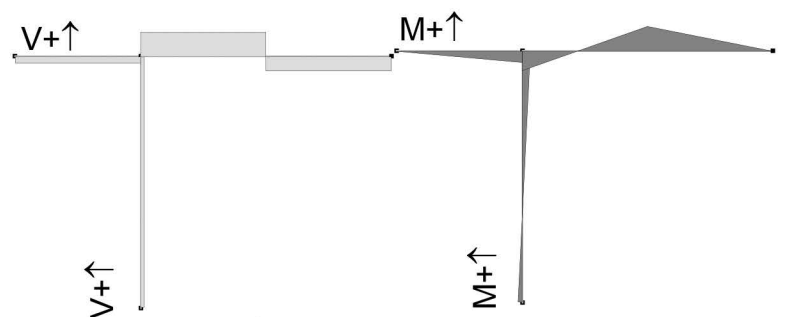
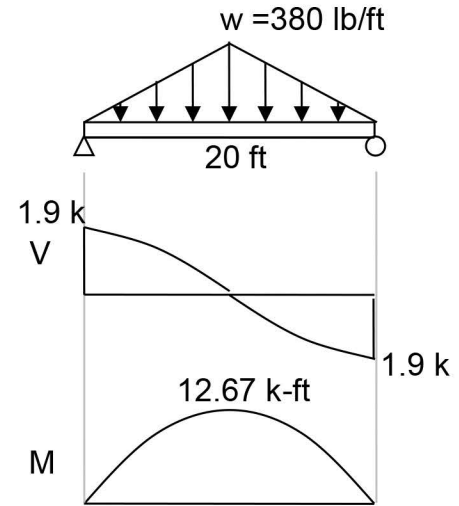


A lintel beam 20 ft long is used in carrying the imposed loads. It is a built up section 8.25” deep of 2 x 8 sides with a 2 x 4 top (2 nails) and a 1 in. x 8 in. plywood bottom (4 nails) as shown. The centroid and moment of inertia for bending about the x axis are given in the figure. Find:

- The maximum bending stress for the section,  $f_b$ .
- The maximum shear stress for the section,  $f_v$ .
- The required shear capacity of the nails for the top [or bottom] connected piece if the pitch spacing is 4.5 inches.

A rigid frame has the shear and bending moment diagrams shown.

- Sketch the deflected shape on the frame outline below.



**Disclaimer: Answers have NOT been painstakingly researched.**

Answers – Not provided on actual quiz!

- $f_b = 2355$  psi
- $f_v = 103$  psi ( $Q_{na} = 43.5$  or  $43.4$  in<sup>3</sup>)
- $F \geq 285$  lb ( $Q_{top} = 17.8$  in) [or 231 lb ( $Q_{bottom} = 28.9$  in)]
- see figure

