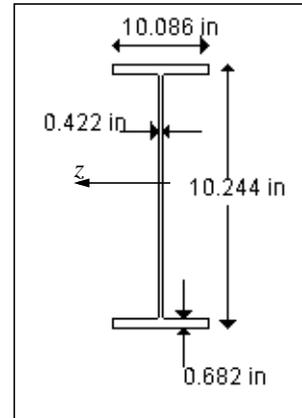
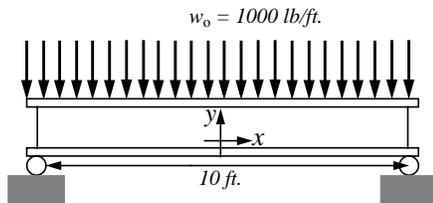


## Class Exercise #19

### 1.050 Solid Mechanics    Fall 2004

#### Problem 9.1

The figure at the right shows the cross section of a steel beam “W10x60” (English units). The moment of inertia about the  $z$  axis is given as  $344.6 \text{ in}^4$  (See “Tools & Data” Steel Section, MIT server 1.050 Note: Upon launching applet, go to options and choose “Choose Section > W”. Scroll down to W10x60. Click on “Detail” and “English units”). A beam of this section, 10 ft. in length, is simply supported at its ends and carries a uniformly distributed load of 1000 lb/ft.



W10x60

Sketch the shear force and bending moment diagram.

Determine the maximum normal stress due to bending,  $\sigma_x|_{\max}$  ;  
where does it act?

Determine the shear stress  $\sigma_{xy}$  at a point on the neutral axis, at the left end of the beam. Then determine the principle stress components, the extreme values of the normal stress components, at the point. Compare these with the maximum normal stress due to bending.