14-9

A simple beam has an 18-ft span and a W18 x 50 section. Determine the maximum flexural stress due to two concentrated loads of 10 kips each applied at the third points of the span and a uniform load of 3 kips/ft (including the weight of the beam) over the entire length of the beam.

Solution.

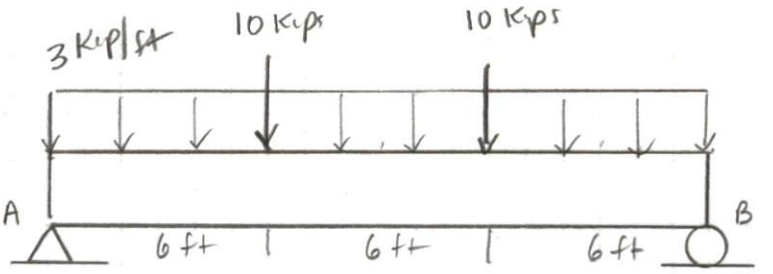

Table 13-1, case 3 and case 4

By Superposition,

$$M_{MAX} = Pa + \frac{wL^2}{8} = 10\,Kip(6\,ft) + \frac{3\,\frac{Kip}{ft}(18\,ft)^2}{8}$$

$$= 60\ Kip\cdot ft + 121.5\ Kip\cdot ft$$

$$= 181.5\ Kip\cdot ft$$

Table A-1(a)

W 18 x 50

$S = 88.9\ in.^3$

$$\sigma_{MAX} = \frac{M_{MAX}}{S}$$

$$= \frac{181.5\ Kip\cdot ft\left(\frac{12\,in}{ft}\right)}{88.9\ in^3}$$

$$= 24.5\ ksi$$