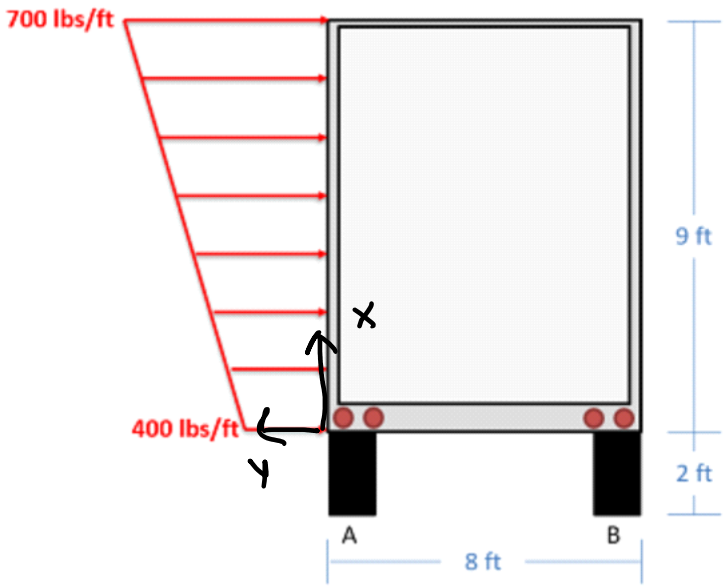
Problem 6

An empty truck trailer with a weight of 17000 lbs is subjected to the wind force shown below. Assuming the weight acts in the middle of the trailer, what is the expected normal forces at the tires on the left and the tires on the right?

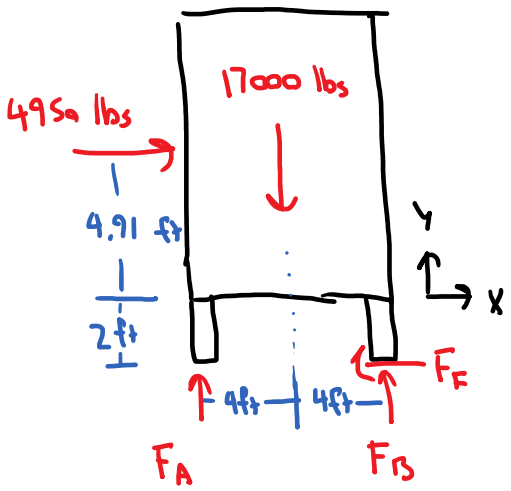


$$F(x) = \frac{100}{3}x + 400$$

$$F_{eq} = \int_0^9 \left(\frac{100}{3}x + 400\right) = \left(\frac{100}{6}x^2 + 400x\right)\Big|_0^9 = \underline{4950 \text{ lbs}}$$

$$X_{eq} = \frac{\int_0^9 \left(\frac{100}{3}x + 400\right)(x)}{F_{eq}} = \frac{\int_0^9 \frac{100}{3}x^2 + 400x}{4950}$$

$$X_{eq} = \frac{\left(\frac{100}{9}x^3 + 200x^2\right)\Big|_0^9}{4950} = \frac{24300}{4950} = \underline{4.91 \text{ ft}}$$



$$\Sigma F_x = 4950 - F_F = 0$$

$$\Sigma F_y = F_A + F_B - 17000 = 0$$

$$\Sigma M_A = -(4950)(6.91) - (17000)(4) + (F_B)(8) = 0$$

$$F_B = \frac{(4950)(6.91) + (17000)(4)}{8} = \underline{11537.5 \text{ lbs}}$$

$$F_A = 17000 - 11537.5 = \underline{5462.5 \text{ lbs}}$$

$$\boxed{F_A = 5462.5 \text{ lbs}} \qquad \boxed{F_B = 11537.5 \text{ lbs}}$$