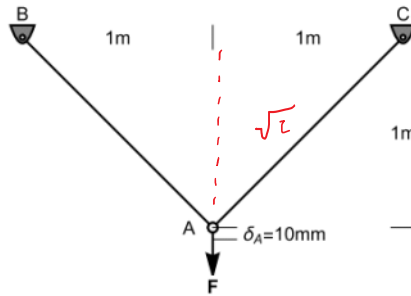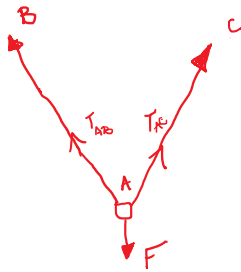Alex Gaskins

3. Two cables support a load as shown. Each cable has a
diameter of 6mm and a Young's Modulus of 200GPa. The
displacement of point D is 10mm downward.

a. Draw a FBD including the cable forces at point A
b. Determine the elongation of each cable
c. Determine the load in each cable, AB and AC
d. Determine the total downward force, F

A.)

B.)

$$\Delta L = L_f - L_i$$

$$L_f = \sqrt{1 + 1.01^2} = 1.42 \, m.$$

$$\Delta L = 1.42 - \sqrt{2}$$

$$= .0071 \, m.$$

C.)

$$\sigma = E(\varepsilon)$$

$$E = \frac{\sigma}{\varepsilon} = \frac{.0071}{\sqrt{2}} = .00501$$

$$\sigma = (200 \times 10^3)(.00501) = 1002 \, MPa$$

$$F = \sigma A = (1002)(\pi r^2)$$

$$F = 28,330.88 \, N.$$

$$A = \pi \left(\frac{6}{2}\right)^2$$

D.)

D.)

$$\text{Shear} = \frac{F}{2} \quad ; \quad (.711)(28,330.88) = 20,150.84 \text{ N.}$$

$$\frac{F}{2} = 20,150.84 \text{ N.} \quad ; \quad F = 40,301.67 \text{ N.}$$