# Problem 1

You are designing an elevator that will be transporting passengers via a single cable. The cable has a tensile strength of 300 MPA. The empty car weighs 800 kg, and you want a maximum capacity of 1000kg. If we wish to have a safety factor of 3, what should the diameter of the cable be?

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$$F_{load} = 17658\,N$$

$$F_{design} = 3 * F_{load} = 52974\ N$$

$$\sigma = \frac{N}{A}$$

$$300 \times 10^6 \frac{N}{m^2} = \frac{52,974\,N}{A}$$

$$A = 1.7658 \times 10^{-4}\,m^2 = \pi r^2$$

$$r = .007497\,m$$

$$\boxed{d = 14.99\,mm}$$