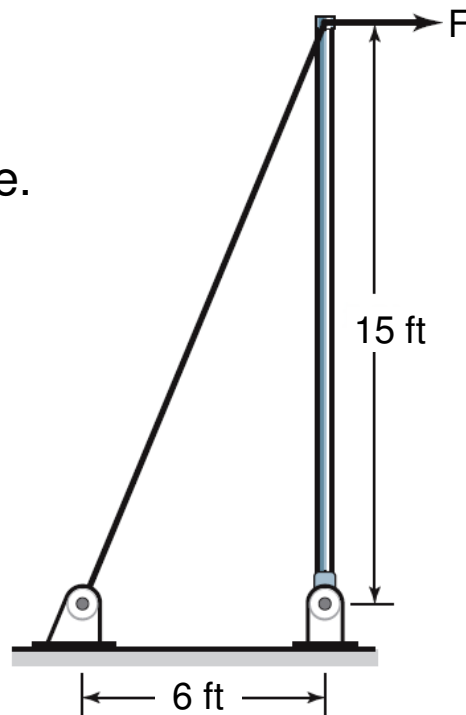


## MEEG3311 Homework 7 – Chapter 9

### 7.1

A low-carbon-steel pipe (AISI 1020, Q&T 870°C), as shown in the sketch, has an outer diameter of 2.5 inches and a wall thickness of 0.25 inch. If the pipe is held in place by a guy wire, determine the largest horizontal force  $F$  that can be applied without causing the pipe to buckle. Assume that the ends of the pipe are both pin connected. The elastic modulus for the steel is 30 million psi.

Hint: Draw a FBD of the forces at the top of the pipe.



If a horizontal load ( $F$ ) of 3000 Lb is applied, what is the factor of safety against buckling?

## 7.2

A solid, round column with a length of 2 m and a diameter of 50 mm is fixed at one end and is free at the other end. The material's yield strength is 300 MPa and its modulus of elasticity is 207 GPa.

A. Assuming concentric loading of the column, determine the critical load.

B. What load on the column would have a factor of safety of 2 against buckling?

C. If the free end is also fixed (i.e., both ends are now fixed), what is the critical load?