Please answer all questions in the homework format listed on the website, except for Problem 1.

1) Cold working a metal by hammering or rolling it to a lesser thickness introduces a large number of dislocations into the crystal structure. Which one of the following statements is correct?

   (a) The yield strength and ductility decrease.

   (b) The yield strength and ductility increase.

   (c) The yield strength decrease and ductility increase.

   (d) The yield strength increase and ductility decrease.

2) Find the moment of inertia for the cross-sectional area of the U-beam shown in Figure 1 about the centroidal x-axis. Dimensions of the flange width w and flange thickness t are shown in Figure 1. Your answers should be in terms of w and t and assume $w \gg t$.
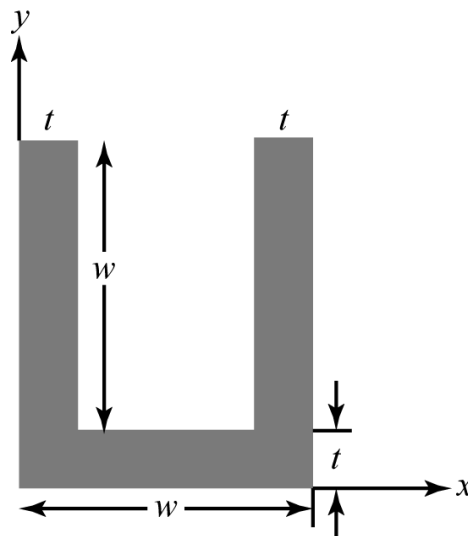

Figure 1. Image of a U-beam with dimensions of the flanges shown in terms of t and w.

3) A glass-sculptor has hired you to engineer the display for his new hanging art-piece. He wants to hang it from the tip of a solid cylindrical cantilever beam that is 2 m long and 75 mm in diameter and made from soda-lime glass. The art-piece weighs 50 kg. What is the safety factor for the cantilever? (Hint: Table 3.10 has properties for soda-lime glass)