

Please show your work and draw a box around your answer to receive full credit.

Readings: Chapter 1-3 and Appendix A

- 1) What are the specific material properties of a) a *tough* material, b) a *stiff* material, and c) a *strong* material?
- 2) Name three primary bonds and three secondary bonds.
- 3) Describe at the atomic level one general way to increase the yield strength for a) a metal and b) a polymer.
- 4) Consider a solid bar in the shape of a hook shown in Figure 1. A coordinate system is also shown. A load P is applied at the end of the hook and is given by:

$$P = -100\hat{i} + 200\hat{j} + 50\hat{k} \text{ Newtons.}$$

What are the reaction forces and reaction moments? What is the normal stress (σ_y) and shear stresses (τ_{xy} , τ_{yz}) at the point Q located at (0, 0, 50 mm)? *Hint:* Hibbler's Example 8.5

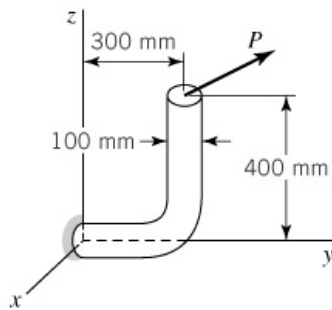


Figure 1. Hook with end-load P .