CME 260 – Mechanics of Materials
Exam #4 (02/28/2024)

StarID or TechID (<u>no names</u>) _____

Do one of the two problems shown below (the second problem is on the back).
<u>Show your work</u> (you will not receive any credit if all you have is a final answer, right or wrong).

1. The motor delivers 15 hp to the pulley at A while turning at a constant rate of 1800 rpm. Determine to the nearest 1/8 inch the smallest diameter of the shaft BC if the allowable shear stress for the steel shaft is τ_{max} = 12 ksi. Assume there is no slippage between the belt and the pulley.
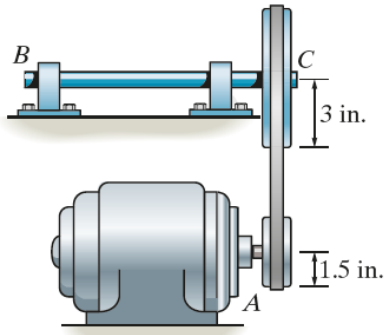
2. The gears at B and C each transmit 150 kW of power developed by the turbine at A. If the rotation of the 100 mm diameter shaft is $\omega = 600$ rev/min, determine the rotation of end D of the shaft relative to A. The shaft is made of A-992 steel. The journal bearing at D allows the shaft to rotate freely about its axis.