Final Exam Problem 04: Chapter 05

The rod shown has a length $L = 4$ft, and is pinned at its end O. The attached spring has a stiffness $k = 50$lb/ft, and an unstretched length $l_o = 2$ft. The spring is unstretched when $\theta = 0°$.

A) Draw the free body diagram for rod OC. Do this carefully and pay attention to the various angles!

B) Calculate the spring force $F = k\Delta l$ by determining the stretched length l of the spring in the position shown.

C) Determine the tension T in the cord when the system is in equilibrium at $45°$ (Hint: You'll need to solve for the spring angle θ!).

D) Determine the reaction force $\vec{R}$ at point O.