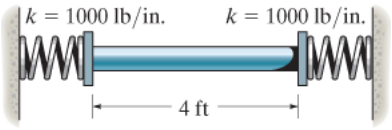
Name:

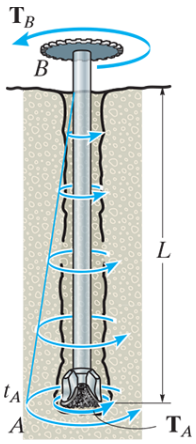
Exam 2 - version A

1. (20 pts.)



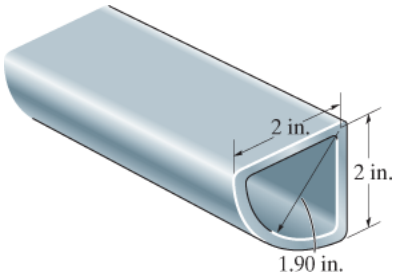
The rod shown has a modulus of $E = 10\,\text{ksi}$ and a coefficient of thermal expansion of $\alpha = 13/°\text{F}$. The rod is 4 ft long at $T = 50°\text{F}$ and the springs are compressed 0.5 in (each). Find the force in the rod when the temperature is $T = 100°\text{F}$.

2. (30 pts.)



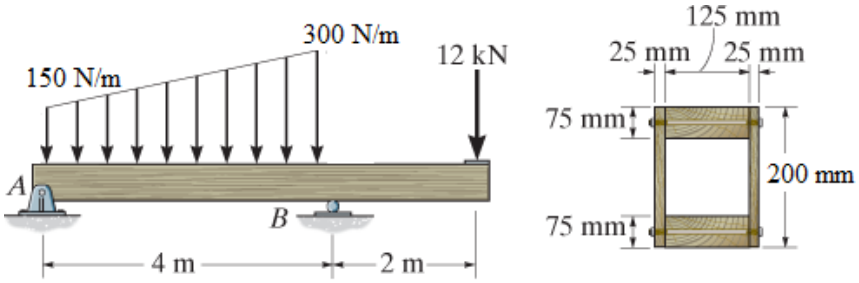
The motor drilling a well operates at a constant angular velocity, ω. There is a (constant) torsional resistance of T_A at the end and a linearly varying distributed resistance from friction of t_a as shown. Find the minimum torque, T_B of the motor and the maximum shear stress in the shaft, which is solid with a radius of r.

3. (20 pts.)



A torque of 5 kip.in is applied to the tube. If the wall thickness is 1/8 in., find the average shear stress in the tube.

4. (30 pts.)



Find the maximum stress in the beam shown.