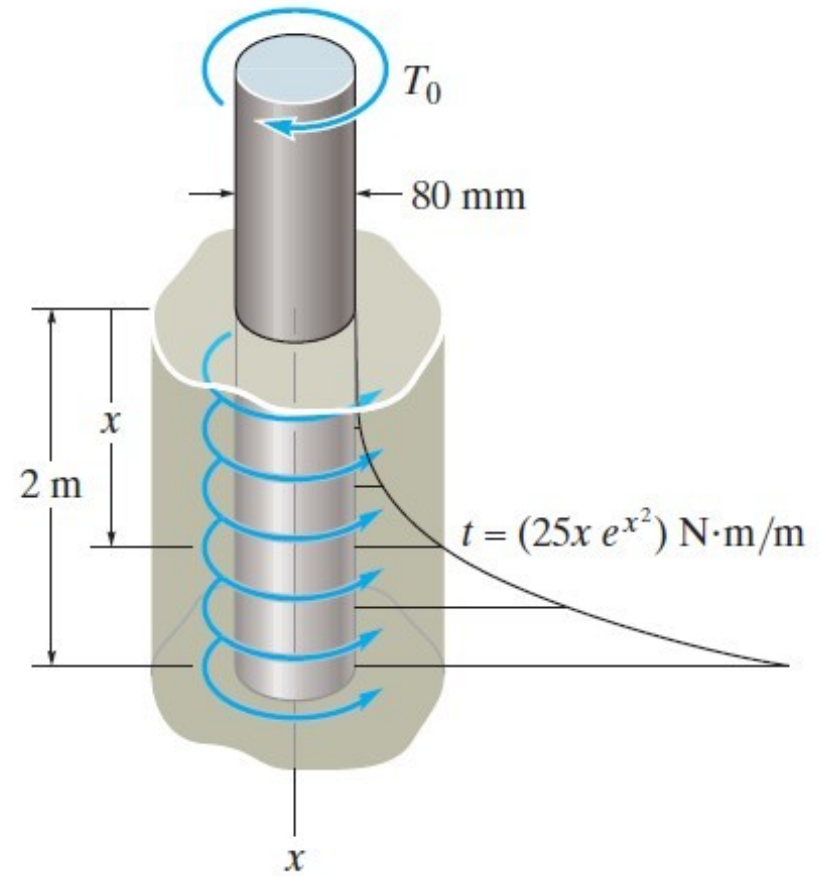
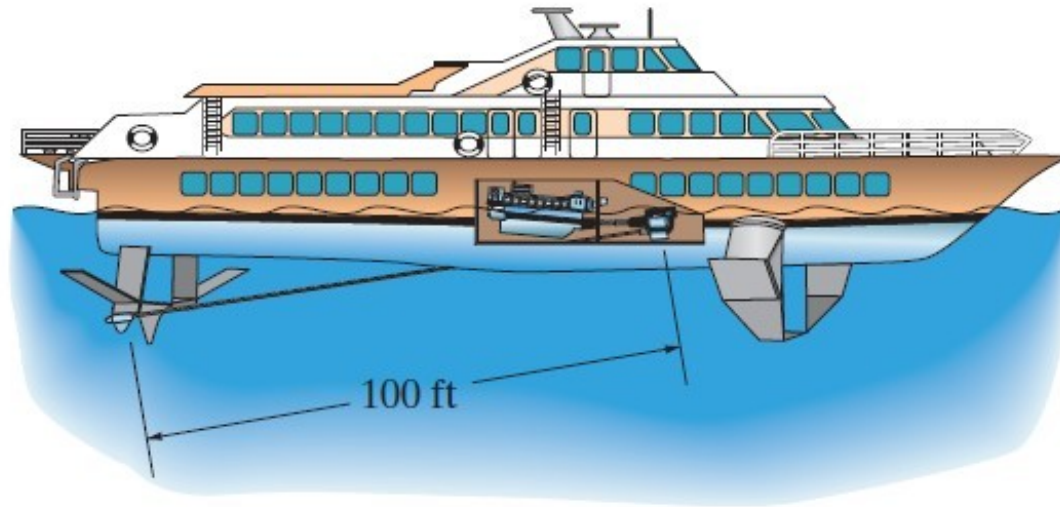


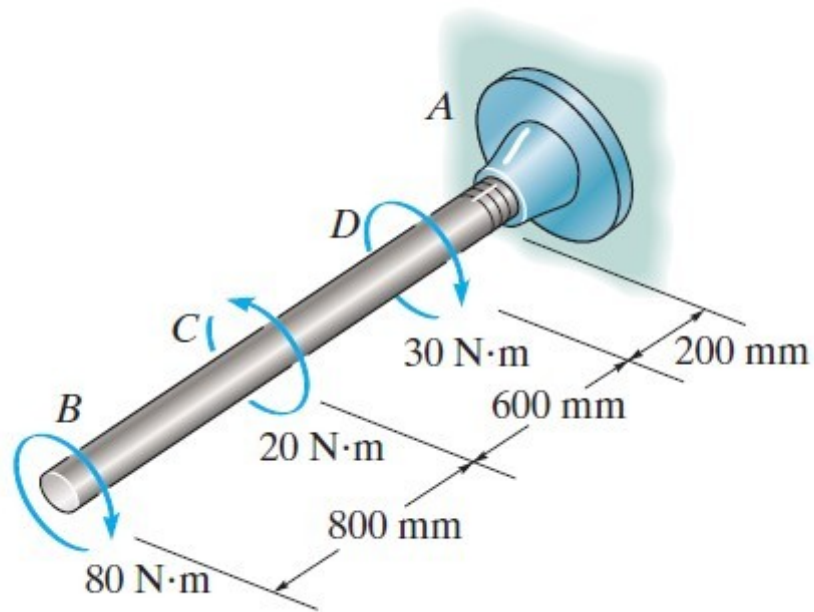
5–30. The shaft has a diameter of 80 mm. Due to friction at its surface within the hole, it is subjected to a variable torque described by the function $t = (25xe^{x^2}) \text{ N}\cdot\text{m}/\text{m}$, where x is in meters. Determine the minimum torque T_0 needed to overcome friction and cause it to twist. Also, determine the absolute maximum stress in the shaft.



5–50. The hydrofoil boat has an A992 steel propeller shaft that is 100 ft long. It is connected to an in-line diesel engine that delivers a maximum power of 2500 hp and causes the shaft to rotate at 1700 rpm. If the outer diameter of the shaft is 8 in. and the wall thickness is $\frac{3}{8}$ in., determine the maximum shear stress developed in the shaft. Also, what is the “wind up,” or angle of twist in the shaft at full power?



5-53. The 20-mm-diameter A-36 steel shaft is subjected to the torques shown. Determine the angle of twist of the end B .



5-78. The A992 steel shaft has a diameter of 60 mm and is fixed at its ends A and B . If it is subjected to the torques shown, determine the absolute maximum shear stress in the shaft.

