HW8.1

Ro = 300mm; Rf = 75mm; Ri = 0.
Total Friction Force around the interface needs to be Torque/Rf = 1,200,000 N.
Total Normal Force at the interface needs to be Friction Force / mu = 4,800,000 N.
The normal force is applied over the interface area = Pi x D x thickness = 35,343 mm^2, resulting in an interface pressure of 135.8 MPa.
It takes a Delta Radial of 0.105mm to create this pressure.

HW8.2

Ro = 50mm; Rf = 27.5mm; Ri = 0.
A radial interference of 25 microns (0.025mm) causes an interface pressure of 65.63MPa.
With an interface area of 5183 mm^2 and friction of 0.2, it would take 68.04kN to disassemble the fit.

HW8.3

Rthin = 75mm; Ri = 75mm; Ro = 105mm.

Thin Wall
Hoop = 200.0 MPa
Axial = 100.0 MPa

Thick Wall
Hoop = 246.67 MPa
Axial = 83.3 MPa

HW8.4

Power divided by speed in Rad/second gives Torque = 79,577 Nm.
Ro = 200mm; Rf = 40mm; Ri = 0.
Total Friction Force around the interface is Torque/Rf = 1,989,437 N.
Total Normal Force at the interface is Friction Force / mu = 7,957,747 N
This is applied over an interface area of 30,159 mm^2, resulting in an interface pressure of 263.86 MPa.
To generate this pressure takes a radial interference of 0.1062mm.
This is a strain (Delta R/ R) = 0.1062 / 40 = 0.00265.
Dividing this by the CTE of 0.000011 /℃ give a Delta T = 241.4 ℃, or 434.5℉.