Because of questions from several students, here is a summary of the analytical versus experimental comparisons that should be in the report. The important ones to put in the main body involves two plots for each specimen. Below I only explain it for the CLOSED tube section.

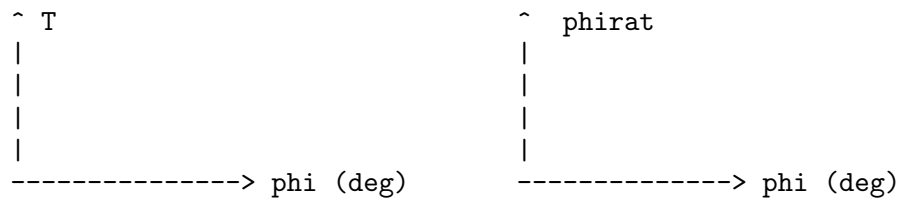
I will use the following symbols here (avoiding greek letters)

- g = the shear strain gamma at the outer surface (on which the extensometer sits)
- tau= the shear stress at the outer surface in psi
- R = exterior radius of specimen, inches (I think it is 3/8", pls check), if the exact theory is used. If you use the CTW theory, the mean radius, but the exact one is recommended
- r = twist rate per unit of axial length, called dphi/dx in the notes
- phi = twist angle between grips (radians in theory, degrees in plots)
- L = speciment length between grips (you should have recorded that)
- T = applied torque in in-lb
- G = shear modulus in psi
- J = for the exact theory for circular cross sections, the polar moment of inertia in (in)^4. If you use the CTW theory, J is J_beta, but the exact theory is recommended
- phirat = the ratio phi/g

Then, from Lecture 7:

g = R r, r = g/R, phi = r L = (L/R)r, phirat = phi/g = L/R
tau = G g = TR/J, g = TR/(GJ) = R r, r = g/R = TR/(GJR)= T/GJ,
phi=TL/(GJ), T = (GJ/L) phi

The two recommended plots are T versus phi and phirat versus phi, configured as



In each graph show theory (above eqs) versus experimental measurements. The latter record g and T, so g should be transformed to phi=g(L/R)=g phirat Note that phirat=L/R is CONSTANT in the theory (a number around 20 or so) But that will not be the case in experiments; typically it starts higher because of initial grip slips, then it should settle close to L/R, unless further slips occur.

Repeat for the OPEN (slit) tube. Here the theoretical phirat will be quite different, and it has to be obtained from OTW theory (Lecture 8)