Matlab intro: You should use matlab4 (or excel) to make plots of displacement and stresses, etc. You will often need to evaluate some expression \( y(x) \) from \( x = x_0 \) to \( x = x_1 \) every \( dx \). Start Matlab by typing `matlab`. Make the \( x \)-vector by saying
\[
x = x_0 : dx : x_1;
\]
For example, to evaluate \( y(x) = 2\pi x(1 - x^2) \) on the interval 1 to 2, every 0.02, try
\[
x = 1 : 0.02 : 2;
\]
\[
y = 2 \times \pi \times x \times (1 - x \times x);
\]
The period before the multiplication symbol (*) means do the multiplication element by element since \( x \) is a vector (the default will do a matrix product which is not what you want in this case). To plot \( y \) vs. \( x \) say `plot(x,y)`. To print out a hardcopy, type `print`. For questions regarding Matlab, try the on-line help (e.g., say `help plot`), talk to your fellow students, consult the manuals, or see Wessel.

1. Problem 3–13 in Turcotte & Schubert
2. Problem 3–14 in Turcotte & Schubert

3. Monoclines are often found when sedimentary layers of rock overlie a vertical fault in the basement. We will assume that the layer behaves elastically and responds by flexure to the change in basement topography. To simplify matters, assume that the clamped plate conditions apply at the fault scarp and at a distance \( L \) from the scarp. Let \( t = 10 \text{ m} \) and \( h = 20 \text{ m} \).

\[
E = 100\text{GPa} \\
v = 0.25
\]

a) What is the equation for the shape of the plate? Plot it.

b) Derive and plot the tensile stresses at the top and bottom of the plate. Where would fractures most likely develop? Indicate this on you illustration or plot.

c) Assume that the sedimentary layer will fail in tension if stresses exceed 25 MPa. What is the smallest value of \( L \) the plate can handle?

d) Extra credit: Monoclines are observed over shorter distances than you found in c). If we still assume that deformation is elastic and that our boundary conditions are applicable, how could we modify the model to reduce the stresses and hence accommodate a shorter \( L \)? (Hint: what are the characteristics of sedimentary rocks?)