**ESS 431 PRINCIPLES OF GLACIOLOGY**

**ESS 505 THE CRYOSPHERE**

**Lecture 07 – Ice Dynamics I: Ice Deformation**

*Due Wednesday, October 16 2019, at start of class*

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| Marshall, S., 2012. *The Cryosphere.*Chapter 6. |

1. What is the typical shear stress at the base of a glacier?
2. What is a constitutive equation (if it isn’t clear from the reading, look it up elsewhere)? What is the name for the constitutive equation for ice flow? What variables does it relate?
3. There are several physical properties not explicitly captured in Glen’s Flow Law, that are often wrapped up in the flow rate parameter. What are two of these complicating factors?
4. Draw a typical ice-flow velocity profile for a glacier, as a function of depth. Where are the velocity gradients (du/dz) the strongest? Given the fact that high values of du/dz mean high values within the strain-rate tensor ($\dot{ε}$), where do you expect heat generation within the ice to be greatest? (Hint: look at the last term of Eq. 6.7 in Marshall).