In the Math Bits, we (may have?) learned that mixed partial derivatives are the same, regardless of the order in which we take the derivative, so

$$\left(\frac{\partial\left(\frac{\partial f}{\partial x}\right)_y}{\partial y}\right)_x = \left(\frac{\partial\left(\frac{\partial f}{\partial y}\right)_x}{\partial x}\right)_y \tag{1}$$

$$\frac{\partial^2 f}{\partial x \partial y} = \frac{\partial^2 f}{\partial y \partial x} \tag{2}$$

In the Math Bits we found a Maxwell relation from the energy conservation law:

$$dU = F_x dx + F_y dy \tag{3}$$

$$\left(\frac{\partial\left(\frac{\partial U}{\partial x}\right)_y}{\partial y}\right)_x = \left(\frac{\partial\left(\frac{\partial U}{\partial y}\right)_x}{\partial x}\right)_y \tag{4}$$

$$\left(\frac{\partial F_x}{\partial y}\right)_x = \left(\frac{\partial F_y}{\partial x}\right)_y \tag{5}$$

$$\tag{6}$$

As you know, in thermodynamics, partial derivatives are often physically measurable quantities. In such a case, their derivatives are also be measurable quantities that we often care about.

In your groups, consider mixed partial derivatives of the thermodynamic potential assigned to you, to derive a Maxwell relation.