ECON 220C PROBLEM SET # 1

NATHANIEL BECHHOFER

1. Questions from textbook

1.1. **Romer 5.8.** We can start with the full Lagrangian, after substituting

$$C_t = K_t + Y_t - K_{t+1} = K_t + AK_t + e_t - K_{t+1} = (1+A)K_t + e_t - K_{t+1}$$

to get

$$\mathcal{L} = E\left[\sum_{t=0}^{\infty} \frac{u(C_t) + \lambda_t((1+A)K_t + e_t - K_{t+1})}{(1+\rho)^t}\right]$$

which gives first order conditions with respect to C_t and K_{t+1} (which are chosen each period) of

$$u'(C_t) = \lambda_t$$

and

$$\lambda_t = \frac{(1+A)E[\lambda_{t+1}]}{(1+\rho)}$$

and combining gives

$$u'(C_t) = \frac{(1+A)E[u'(C_{t+1})]}{(1+\rho)}$$

but since $A = \rho$, we are left with a more standard

$$u'(C_t) = E[u'(C_{t+1})]$$

and we can substitute for $u'(C_t)$ since we are given the form of the utility function to get

$$u'(C_t) = 1 - 2\theta C_t$$

and we now have

$$1 - 2\theta C_t = E[1 - 2\theta C_{t+1}]$$

and from linearity of expectation we can cancel terms to get

$$C_t = E[C_{t+1}]$$

as our Euler equation.

2. Permanent income hypothesis and the "excess smoothness" puzzle

2.1. **Saving responses to shocks.**

3. Estimation of adjustment costs

4. Practice log-linearization

4.1.

4.2.

4.3.

4.4.

4.5.

4.6.

4.7.