ECON 210C PROBLEM SET # 4

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1. Labor supply problem

2. Demand shock

3. Business cycle and external returns to scale

(a). Each firm sets wage equal to marginal product of labor, so we have

$$W_t = Y_t^{1-1/\gamma} \left(\frac{K_{it}}{L_{it}} \right)^{\alpha} Z_t^{1-\alpha}$$

and so we can find labor demand as a function of wages

$$L_{it} = (W_t Z_t^{\alpha-1} Y_t^{1/\gamma-1} K_{it}^{-\alpha})^{-\frac{1}{\alpha}}$$

which simplifies to

$$L_{it} = W_t^{-\frac{1}{\alpha}} Z_t^{\frac{1-\alpha}{\alpha}} Y_t^{\frac{1-1/\gamma}{\alpha}} K_{it}$$

(b). Integrating both sides over all firms, we have

$$L_t = W_t^{-\frac{1}{\alpha}} Z_t^{\frac{1-\alpha}{\alpha}} Y_t^{\frac{1-1/\gamma}{\alpha}} K_t$$

so we can start to solve for aggregate production, so we get

$$Y_t^{\frac{1-1/\gamma}{\alpha}} = \frac{L_t}{K_t} \times W_t^{\frac{1}{\alpha}} Z_t^{\frac{\alpha-1}{\alpha}}$$

and solving for Y gives

$$Y_t = \left(\frac{L_t}{K_t} \right)^{\frac{\alpha}{1-1/\gamma}} W_t^{\frac{1}{1-1/\gamma}} Z_t^{\frac{\alpha-1}{1-1/\gamma}}$$

4. Problems from Romer

4.1. **Problem 6.10.**

4.2. **Problem 6.11.**

4.3. **Problem 6.12.**