Homework # 2
Suggested Answers

1. First, solve for equilibrium price by equating supply and demand:

\[ \alpha + \beta P = \gamma + \delta P \Rightarrow \]

\[ P = \frac{\alpha - \gamma}{\delta - \beta} \]

Second, substitute the equilibrium price into either the demand or supply equation. If one substitutes into the demand equation,

\[ Y = \alpha + \beta \left( \frac{\alpha - \gamma}{\delta - \beta} \right) = \alpha + \frac{\alpha \beta - \gamma \beta}{\delta - \beta} = \frac{\alpha \delta - \alpha \beta - \gamma \beta}{\delta - \beta} + \frac{\alpha \beta - \gamma \beta}{\delta - \beta} \]

\[ = \frac{\alpha \delta - \gamma \beta}{\delta - \beta} \]

2. Rewrite equilibrium output as

\[ Y = \frac{\alpha \delta - \gamma \beta}{\delta - \beta} = \frac{\alpha \delta}{\delta - \beta} - \frac{\gamma \beta}{\delta - \beta} \]

A one unit change in \( \alpha \) therefore changes equilibrium output by

\[ \frac{\delta}{\delta - \beta} \]

This is increasing in \( \delta \) if \( \beta < 0 \). Intuitively, the larger \( \delta \), the greater the extent to which exogenous increases in demand are met by increased production rather than higher prices. Note that if \( \beta < 0 \), then \( \frac{\delta}{\delta - \beta} < 1 \), so output increases by less than the initial shift in demand. Make sure you understand why this is so. If \( \beta = 0 \), then a 1 unit exogenous demand leads to a 1 unit change in output. This is so because \( \beta = 0 \) means that demand does not respond to price.
Another way to think about this problem is to start by considering the case where $\delta = 0$, so that the aggregate supply schedule is vertical. In this case, shifts in demand only cause price changes. In contrast, if the supply schedule is horizontal, then aggregate demand shifts lead output changes with no price changes. Moving from one case to the other, the flatter the supply curve, the larger the output changes.

3. In the two-period consumption problem, it is easy to see that first period consumption may increase if the interest rate increases. Intuitively, an interest rate increase lowers the relative price of consumption tomorrow relative today. (Remember that 1 unit of consumption tomorrow requires giving up $1/(1 + r)$ units of consumption today.) From your previous study of microeconomics, you know that changes in relative prices produce income and substitution effects. The substitution effect will lower current consumption, but the income effect will raise it. Hence, without knowing more about the individual’s preferences, one cannot say whether the interest rate increase raises or lowers consumption, but one can say it is possible. As an exercise to help understand this, you should represent this argument graphically.

4. Under the assumptions of the problem, if the consumer decides to give up 1 unit of consumption today, he loses 1 unit of utility from the change in current consumption. Given the interest rate, utility from consumption next period will increase by $0.9(1 + r)$. These effects do not depend on the levels of consumption in the two periods. Therefore the consumer will follow the rule

- consume all income today if $1 > 0.9(1 + r)$
- save all income today if $1 < 0.9(1 + r)$

(If $1 = 0.9(1 + r)$, then all consumption/savings decisions produce the same utility.) This extreme behavior is due to the fact that the marginal utility of consumption in each period does not depend on the level of consumption. One usually expects marginal utility to decline in the level of utility, which will in general lead to consumption in both periods regardless of the interest rate.