Ten *Sapling* multiple-choice questions. You have unlimited attempts to complete the assignment and they are due at midnight on the date above.

The written questions below are due at the beginning of class and should be typed.

1. Chapter 5. Problems and Applications #1.

> **Solution.**
>
> a) **To find the growth rate of nominal GDP, we start with the quantity equation $MV = PY$, and note that PY is equal to nominal GDP, or the value of the goods and services produced measured in current dollars. If we express this formula in percentage change form we have:**
>
> > **% Change in M + % Change in V = % Change in PY.**
>
> **If we assume the percentage change in velocity is zero, then the percentage change in nominal GDP is equal to the percentage change in the money supply, or 8 percent.**
>
> b) **To find the inflation rate, express the quantity equation in percentage change form:**
>
> > **% Change in M + % Change in V = % Change in P + % Change in Y.**
>
> **Rearranging this equation tells us that the inflation rate is given by:**
>
> > **% Change in P = % Change in M + % Change in V – % Change in Y.**
>
> **Substituting the information given in the problem, we thus find:**
>
> > **% Change in P = 8% + 0% – 3% = 5%.**
>
> c) **The real interest rate is 4 percent: the nominal interest rate of 9 percent minus the inflation rate of 5 percent.**

2. Chapter 5. Problems and Applications #5.

> **Solution.**
>
> a) **Legislators wish to ensure that the real value of Social Security and other benefits stays constant over time. This is achieved by indexing benefits to the cost of living as**

measured by the consumer price index. With indexing, nominal benefits change at the same rate as prices.

b) Assuming the inflation rate is measured correctly (see Chapter 2 for more on this issue), senior citizens are unaffected by the lower rate of inflation. Although they get less money from the government, the goods they purchase are cheaper; their purchasing power is exactly the same as it was with the higher inflation rate.

3. Chapter 5. Problems and Applications #7.

Solution.

a. When the company decides to issue a new catalogue monthly instead of quarterly, this is an example of menu costs. Productive resources will be taken from other activities in order to update the catalogue more frequently, so the price of the goods keeps up with the costs incurred by the company and the real value of their profit is maintained.

b. Unexpected inflation is reducing the real value of the annuity. When there is unexpected inflation, creditors lose and debtors win. In this case, grandpa is the creditor since he is owed the $10,000 per year from the insurance company. The insurance company is the debtor and it wins because it is paying grandpa each year with dollars that are less valuable, reducing the real value of the amount it has to pay.

c. Spending money quickly before it loses value is an example of shoe leather costs. Maria is diverting time and energy from other activities so that she can convert her money into goods and services before its value has eroded from the hyperinflation. She has no incentive to save her income.

d. Gita is being taxed on her nominal gain and not her real gain. Gita earned a 5 percent nominal return (the $50,000) and had to pay 20 percent of this amount in taxes. Her real return was actually –5 percent (the 5 percent nominal return minus the 10 percent inflation), so if the tax rate had been defined as a percentage of real earnings, then she would not owe any tax.

e. If your father earned $4 and you earn $9, then you are paid 125 percent more in nominal terms (5/4 times 100). You are only luckier than your father if the current price level is less than 125 percent higher than the price level during your father's time. To figure out whether you are better off than your father, you would need to compare the two real wages.

4. Use FRED to download U.S. quarterly data for the CPI and the GDP deflator over the past 10 years. What is the average growth rate for each price level measure? Provide at least one explanation for any observed differences between the two growth rates.

Solution. **The annual growth rate can be found by fitting an exponential curve, $A \cdot exp(gt)$, through the data and then multiplying the estimate of g by four. For the CPI, this gives an annual growth rate of 1.60%. For the GDP deflator, the annual growth rate is 1.52%. One possible reason for the faster growth rate in the CPI is that housing makes up a relatively larger portion of the CPI basket than GDP. The housing market has been recovering at a fast pace since the Great Recession. See the graphs below for the price level data and best-fitting exponential trend line. Another option is to just download the data in growth rates and take the averages, which will give a similar answer.**

GDP Deflator $y = 96.716e^{0.0038x}$

CPI

$y = 208.5769e^{0.0040x}$