ASSIGNMENT #2
Due Wednesday January 19
(at the beginning of the class)

Show all your calculations for credit.

Problem I – Automatic stabilizers

1. Consider the following model – MODEL 1 - of the goods market (circle the correct answer when relevant)

   \[ C = 200 + 0.75 Y_D \]  (1)  C is consumption

   \[ Y_D = Y - T \]  (2)  Y_D is disposable income

   \[ T = 500 \]  (3)  T is taxes and Y is income

   \[ I = 200 \]  (4)  I is investment

   \[ G = 475 \]  (5)  G is government spending

   \[ Z = C + I + G \]  (6)  Z is aggregate demand

   a. Are taxes \underline{endogenous} or \underline{exogenous}?

   b. Calculate equilibrium income  \[ Y= \underline{ } \]

   c. Calculate the budget surplus  \[ \underline{ } \]

   Throughout the assignment always include the relevant sign to indicate whether the economy is in presence of a surplus (+) or of a deficit (-)
2. Now consider a similar model - **MODEL 2** - of the goods market. All the relations are the same except for the introduction of a progressive tax to replace the flat tax.

\[
C = 200 + 0.75 Y_D \quad (1) \quad \text{C is consumption}
\]

\[
Y_D = Y - T \quad (2) \quad Y_D \text{ is disposable income}
\]

\[
T = 100 + 0.2Y \quad (3) \quad T \text{ is taxes and } Y \text{ is income}
\]

\[
I = 200 \quad (4) \quad I \text{ is investment}
\]

\[
G = 475 \quad (5) \quad G \text{ is government spending}
\]

\[
Z = C + I + G \quad (6) \quad Z \text{ is aggregate demand}
\]

a. Are taxes **endogenous** or **exogenous**?

b. Calculate equilibrium income \( Y = \) ____________

c. Calculate the total amount of taxes paid by the public \( T = \) ____________

Calculate the budget surplus \( G - T = \) ____________

3. Let’s now carry out some experiments with the 2 models above.

Assume that a shock rocks the economy and that consumer confidence drops. This can be modeled by a decrease in the term \( C_0 \) of the consumption function.

Now, we replace the consumption function above by

\[
C = 100 + 0.75 Y_D \quad (1) \quad C \text{ is consumption}
\]
a. Calculate the resulting changes in Y, in Tax and in the budget surplus with MODEL 1 (make sure you specify the sign + or – for all the changes)

\[ \Delta Y = \text{__________________} \]

\[ \Delta T = \text{__________________} \]

\[ \Delta BS = \text{__________________} \]

b. Calculate the resulting changes in Y, in Tax and in the budget surplus with MODEL 2

\[ \Delta Y = \text{__________________} \]

\[ \Delta T = \text{__________________} \]

\[ \Delta BS = \text{__________________} \]

c. Calculate the multiplier in MODEL 1 \( (m^1) \) and in MODEL 2 \( (m^2) \).

\[ m^1 = \text{__________________} \]

\[ m^2 = \text{__________________} \]

Explain why the impact of the shock is different in the 2 models.
Problem 2 – Investment/Savings approach

Consider the following model of the economy

\[ C = 200 + 0.75 Y_D \quad (1) \]
\[ Y_D = Y - T \quad (2) \]
\[ T = 100 + 0.2Y \quad (3) \]
\[ G = 300 \quad (4) \]
\[ I = 200 \quad (5) \]
\[ Z = C + I + G \quad (6) \]

where
- \( C \) is consumption
- \( Y_D \) is disposable income
- \( Y \) is income
- \( T \) is taxes
- \( G \) is government spending
- \( I \) is investment
- \( Z \) is aggregate demand

a. Which variables are endogenous? ______________________

Which variables are exogenous? ______________________

b. Calculate equilibrium income. ________________

Calculate the multiplier \( m \). ________________

Calculate the corresponding equilibrium for the following variables:

Disposable income ________________

Consumption ________________

Taxes ________________
Private saving
Government saving
Total saving

c. Present the 2 versions of the equilibrium condition in its general form and plug the relevant numbers to prove that your results above are correct (use Z for aggregate demand).

Equilibrium condition 1 - general form

Proof with values of variables:

Equilibrium condition 2 - general form:

Proof with values of variables:
Problem 3 – Velocity

a. Calculate the velocity for each of the 4 years using the table below:

<table>
<thead>
<tr>
<th>Year</th>
<th>PY</th>
<th>M</th>
<th>i</th>
<th>W</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>1964</td>
<td>648</td>
<td>160.3</td>
<td>4.03</td>
<td>1997.1</td>
<td></td>
</tr>
<tr>
<td>1974</td>
<td>1458.6</td>
<td>274.3</td>
<td>7.82</td>
<td>4078.9</td>
<td></td>
</tr>
<tr>
<td>1984</td>
<td>3777.2</td>
<td>552.1</td>
<td>11.89</td>
<td>11209.6</td>
<td></td>
</tr>
<tr>
<td>1994</td>
<td>6736.9</td>
<td>1147.6</td>
<td>6.27</td>
<td>19493.4</td>
<td></td>
</tr>
</tbody>
</table>

PY is nominal income ($ billions)
M is the nominal money supply ($ billion)
i is the interest rate (as %)
W is wealth ($ billions)
V is velocity

b. Assuming that the changes in the rate of interest are the only changes (ceteris paribus), what is the impact of these changes on the money demand at the same level of income?

What is the resulting impact on velocity?

c. Do the changes in wealth have an impact on the velocity?

Why or why not?