1. Start with the GDP identity $Y = C + I + G + NX$. Substitute in the consumption function that is listed and the values for $I$, $G$, and $NX$. This produces the equation

$$Y = 400 + .5(Y - T)$$

which in turn implies that

$$Y = 800 - T$$

The multiplier associated with $G$, $I$, and $NX$ is \( \frac{1}{1 - c} = 2 \). Notice that this does not depend on the levels of the variables. Why? This is an implication of the fact that the model is linear. The tax multiplier is -1, which is immediate from the second equation.

2. When investment obeys this equation, then the GDP equation, after substitutions into the GDP equations in question 1, yields

$$Y = 400 + .5(Y - T) + .1Y$$

which means that equilibrium output is

$$Y = \frac{1000 - .5T}{4}$$
The multiplier for \( G \) is \( \frac{10}{4} \) and the multiplier for \( T \) is \( \frac{5}{4} \). Why is there a difference from the answer found in question 1? The difference is induced by the feedback from \( Y \) onto \( I \), which increases the magnitude of the multiplier.

3. The net effect of increasing \( G \) and \( T \) on output is the sum of the two multipliers. If investment does not depend on income, then the sum is 1; if it does, then the sum is 5/4. The reason why the “balanced budget” multiplier is not 1 in the latter case is that investment does not depend on taxes.

4. If one substitutes this equation into the GDP identity, then (assuming that investment does not depend on income), then the multipliers are \( \frac{20}{11} \) for \( G \) and \( \frac{10}{11} \) for \( T \). To see this, notice that

\[
Y = 300 + G + .5\left(Y - .1Y - 10\right)
\]

where the values of \( I \) and \( NX \) are replaced with 100. The multipliers can be calculated after a bit of manipulation of this equation, i.e. by observing that this equation implies

\[
Y = 300 + G + .5\left(.9Y\right) - 5 = 295 - .45Y
\]

so that equilibrium output obeys

\[
Y = \frac{1}{1-.45} \left(295+G\right) = \frac{20}{11} \left(295+G\right)
\]

and observing that a 1 unit increase in the fixed part of taxes decreases initially changes spending by .5.

How is the deficit affected? \( G \) increases by 1. Taxes increase by 1 (this is this fixed change) plus .1 \( \times \) the change in output, which is positive. Therefore, the deficit decreases. The second part of the change in tax revenues is what is key.
5.

a. the marginal propensity to consume is .5
b savings equals disposable income minus consumption, just take the difference of the 2 columns.

c. the marginal propensity to save is .5 

6.

a. the consumption function is \( C = 100 + .9(Y - T) \) where 100 means $100 billion

b. the aggregate expenditure function is \( AE = 600 + .9Y \)

c. equilibrium output (which is the same as equilibrium expenditure) is $6000 billion, i.e. $6 trillion

d. equilibrium output decreases by $1000 billion, i.e. $1 trillion; the multiplier is 10.

7.

a. consumption function is \( C = 1 + .9(Y - T) \) where “1” means 1 billion.

b. the aggregate expenditure function is \( AE = 6.4 + .9Y \)

c. equilibrium output is $64 billion

d. equilibrium output decreases by $30 billion; the multiplier is 10.