Problem 6, 4/e

(a) As government expenses are unchanged, future taxes need to increase to satisfy the intertemporal budget constraint of the government. We are therefore in the context of the Ricardian equivalence. Thus, neither of the real interest rate, aggregate output, employment or the real wage is affected.

(b) We are now violating the conditions of the Ricardian equivalence. There is potentially an impact. There are three types of consumers and two types will be affected.

(i) The first type of consumers are those that are savers before and after the change in current taxes. This group will not be affected.

(ii) The second type of consumers are those that are borrowers before and after the change in current taxes. For this group, they will experience a positive income effect, and an improvement in their utility. The situation is shown in Figure (a) below. When the endowment point shifts from $E = (Y - t_1, Y' - t_1)$ to $H = (Y - t_2, Y' - t_2)$, this individual's indifference curves shifts from $I_0$ to a higher $I_1$ level. For this individual, $C$ and $C'$ increase since both are normal goods, and current leisure also increases because it is also a normal good. Thus, for this group of consumers, current labor supply decreases.
(iii) The third group is the group that becomes savers after the change in current taxes from borrowers before. This is the only group that would experience a change (decrease) in the interest rate. Thus, there will be both an income and substitute effects. This is shown in Figure (b) below. The positive income effect will produce the same results as the type (ii) consumers. The substitution effect, which is shown as point A in Figure (b), increases demand for current goods, but decreases demand for future goods. But what about current labor supply? The decision about current and future labor is determined by \( \frac{(1+r)W}{W'} \). A decrease in the interest rate, reduces current labor supply since now \((1+r)W\) decreases relative to \(W'\). As a result, current labor supply also decreases because of the substitution effect. In then end, current consumption demand increases and labor supply decreases.
The first round effects are that labor supply decreases, $N^s(r)$ shifts left in the right-hand diagram above. Since current consumption increases, $Y^d$ in the left-hand diagram shifts to the right. The implications are that the interest rate increases, thus leading to a second shift in the labor supply, an increase that has to be larger than the initial decrease, as equilibrium output has increased. In the end, the general equilibrium effects are that aggregate output, consumption, labor and the real interest rate are all up, while the real wage is down.
Problem 8

Labor supply shifts to the right, so output supply also shifts to the right. Consumption demand also increases, so the output demand curve must also shift to the right. Output must increase although the real rate of interest may rise or fall. In light of the increase in output, equilibrium employment must increase. A higher level of employment, in the absence of a shift in the labor demand curve, assures us that the real wage rate must also fall. Investment rises if the real rate of interest declines, and investment falls if the real rate of interest increases. Because output has increased, consumption will rise as long as investment remains the same or declines. Consumption falls only in the case of a decline in the rate of interest of sufficient size to increase investment by more than the increase in output. There is also an additional effect on C coming from a change in r that you need to discuss, see below. At the end, \( \Delta C = \Delta Y - \Delta I (\Delta G = 0) \).

(a) To summarize: \( Y \uparrow, N \uparrow, w \downarrow, r \uparrow, I \uparrow, C \uparrow \), but most likely increases.

The change in preference causes current labor supply to increase from \( N_1^s \rightarrow N_2^s \).

Output supply will also shift from \( Y_1^s \) to \( Y_2^s \).

The change in preference for more current consumption will shift \( Y_d \) to the right.

\( Y \) must increase, but \( r \) may increase or fall.

The change in \( r \) will shift the \( N^s \) curve depending on whether \( r \) is an increase or decrease in \( r \). But employment must increase (because of an increase in output). And real wage must fall.

Investment may increase or decrease depending on whether \( r \) increases or decreases.

Consumption increases because of an increase in \( Y \), and may increase or decrease due to change in \( r \). Thus the net effect on consumption is unclear.
Problem 9

A temporary increase in $z$ increases output and employment. In the labor market, since $MP_w$ has increased, demand for labor increases. This raises the real wage. In the output market, the supply of output increases, $Y^s$ shifts right because of the increased productivity of the inputs. This lowers the real rate of interest. Consumption and investment both increase. But, this will also cause a decrease in the labor supply due to the lower interest rate, thus labor supply curve shifts left. We know the general equilibrium effects are that $Y$ increase, real interest rate is lower, real wage is higher, but employment may be higher, lower, or stay the same.

An increase in future total factor productivity, $z'$, shifts the current-period output demand curve to the right. This is because with the expectations of higher productivity of capital in the next period, investment this period increases. Thus, $Y^d$ shifts right. Current output and the real interest rate increase. (Note that the net effect on investment is not really clear since the rise in the real interest rate will offset the increase due to the expected rise in future productivity. Similarly, the change in $C$ is also unclear since the increase in $Y$ has a positive income effect, but the increase in real interest rate has both income and substitution effects on $C$. At the end, we require that $\Delta Y = \Delta C + \Delta I$, provided $\Delta C$ and $\Delta I$ are not both negative.) In the labor market, employment increase, since labor supply shifts right due to higher interest rate. Since the current-period labor demand curve does not shift, the shift in labor supply due to the higher real interest rate causes the real wage rate to decline.

A permanent increase in total factor productivity simply combines the effects of the temporary and permanent changes in $z$. Current output unambiguously increases. Employment, although appears to be ambiguous, but will most likely increase. The real wage rate may either rise or fall. The real interest rate may either rise or fall. As long as the direct effect of the increase in $MP_k$ outweighs any indirect effect due to a possible increase in the real interest rate, then investment will increase. As long as the direct effects of the increases in current and future income dominate any indirect effect of a possible rise in the real interest rate, then consumption will also increase.