11) The initial equilibrium is at $k_1^*$ and $y_1^*$.

(b) the definition of half the capital stock, all else equal, reduces the capital worker ratio, $k_2^*$, falls to, say, $k_2^*$, and $y_2^*$ to $y_2^*$. The out-migration of workers, once this is a one time event, all else equal, capital per worker would increase. On the net then, $k_1$ can be anywhere between $k_2^*$ and $k_1^*$, at $k_1^*$ or beyond $k_1^*$.

(c) Since the parameters that determine the steady-state ($c, z, n, d$) all shocks are one-time event, steady-state equilibrium will return and remain at $(k_1^*, y_1^*)$. 
(2) Government spending in the Solow model.

(a) By assumption, we know that T = G, and so we may write:

\[ K' = s(Y - G) + (1 - d)K = sY - sgN + (1 - d)K \]

Now divide by N and rearrange as:

\[ k'(1 + n) = szf(k) - sg + (1 - d)k \]

Divide by \((1 + n)\) to obtain:

\[ k' = \frac{szf(k)}{1 + n} - \frac{sg}{(1 + n)} + \frac{(1 - d)k}{1 + n} \]

Setting \( k = k' \), we find that:

\[ szf(k^*) = sg + (n + d)k^* \]

(b) The two possible steady states are shown in the diagram below.
(c) The effects of an increase in $g$ are depicted in the bottom panel of the figure above. Capital per capita declines in the steady state. Steady-state growth rates of aggregate output, aggregate consumption, and investment are all unchanged. The reduction in capital per capita is accomplished through a temporary reduction in the growth rate of capital.

(3) In this problem, there is a simultaneous increase in both future income and the real interest rate. The increase in future income is a positive income effect for both borrowers and lenders. The increase in the real interest rate includes a pure substitution effect and a pure income effect. The substitution effect induces the consumer to consume less in the current period and more in the second period. The direction of the pure income effect part of the real interest rate change depends on whether the consumer is a borrower or a lender. Lenders are better off with a higher real interest rate and borrowers are worse off with a higher real interest rate.

The top figure below shows the case of a borrower. The consumer starts out with endowment $E_1$ and picks point A on indifference curve $I$. The diagram shows the case in which the positive income effect of the increase in $y$ is exactly canceled out by the negative income effect of the increase in $r$, i.e., there is only a net substitution effect, the net income effect is zero. In this particular case, $c$ falls and $c'$ increases. Since current income is fixed, the consumer must increase saving. For the borrower, this amounts to a reduction in borrowing. The consumer therefore picks point B, which is also on indifference curve $I$, but which is parallel to a budget line that passes through $E_2$.

(i) What if the net income effect is negative, in addition to the substitution effect? In this case, then $c$ definitively would decrease. The change in $c'$ is unknown, however, since the substitution effect increases it, but the net negative income effect decreases it.

(ii) What if the net income effect is positive, in addition to the substitution effect. In this case, $c'$ would increase, but the change in $c$ is unknown.

The bottom figure below shows the case of a lender. The consumer starts out with endowment $E_3$. The consumer chooses point D that is a tangency of indifference curve $I_1$ with the budget line that
passes through point $E_3$. The disturbance shifts the budget line out to the line that passes through $E_4$, the new endowment point. The substitution effect moves the consumer from point $D$ to point $G$ on $I_1$. The pure substitution effect induces a reduction in $c$ and an increase in $c'$. The net income effect is then represented by a parallel shift in the line through $G$ to the new budget line. In this case, the two income effects move in the same direction. Therefore both $c$ and $c'$ increase from point $G$ to point $F$. Second-period consumption unambiguously increases. First-period consumption (and therefore savings) may either rise or fall. The bottom figure below shows the case in which $c$ increases. If $c$ increases, $s$ must fall.