

Problem Set #6
Suggested solutions

2. (Chapter 7) An increase in the marginal product of efficiency unit of labor increases the real wage rate, and increases output. However, the increase in z does not change the equilibrium growth rates. The economy has higher paths for consumption and output, but the two paths share the same growth rate.
1. (Chapter 8) Given information:

$$y = 100$$

$$y' = 120$$

$$t = 20$$

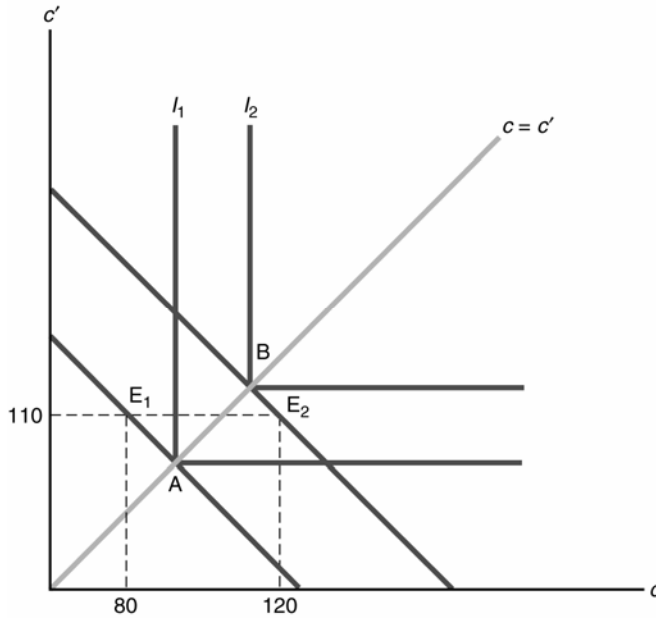
$$t' = 10$$

$$r = 0.1$$

- (a) To calculate wealth, we compute:

$$w = y - t + \frac{y' - t'}{1+r} = 80 + \frac{110}{1.1} = 180$$

- (b) In the perfect complements case, the indifference curves are like I_1 and I_2 in the figure below.



- (c) The consumer's optimal consumption bundle is at point A. Point A simultaneously solves:

$$c = c', \text{ and}$$

$$c + \frac{c'}{1+r} = c + 0.91c' = 180$$

Upon solving, we find that $c = c' = 94.2$. Savings is therefore given by:

$$s = y - t - c = 80 - 94.2 = -14.2$$

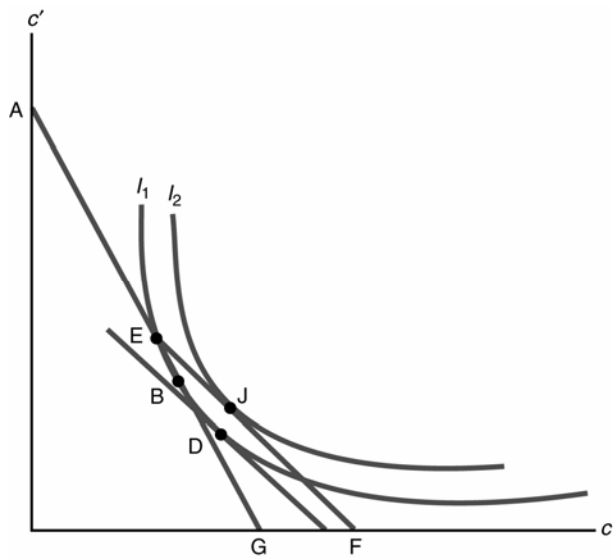
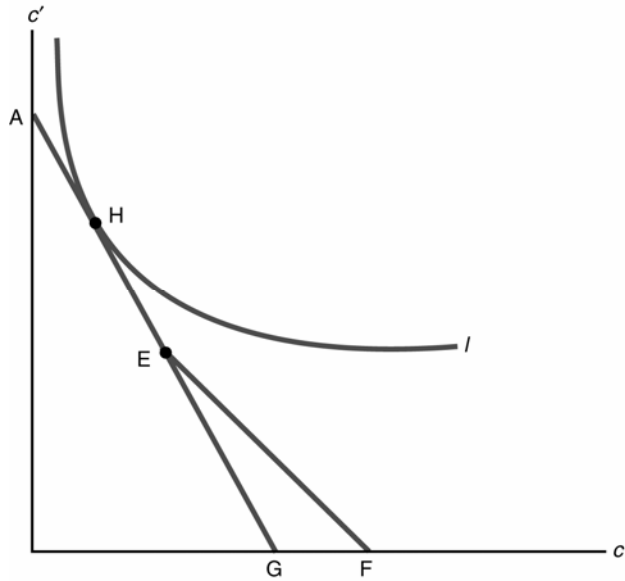
The consumer is a borrower. In the figure above, the endowment point is E_1 and the consumer chooses A.

- (d) First-period income rises from 100 to 140. We now recompute $w = 220$. Solving as in part (c), we find that $c = c' = 115.2$, and $s = 4.8$. In the figure above, the endowment point is E_2 and the consumer chooses B.
- (e) In part (c), the consumer is a borrower. In part (d), first-period income increases and savings has consequently increased enough that the consumer is now a lender.

3. This problem involves a firm's offer to provide an interest-free advance on the consumer's income. If the consumer takes the advance, then his lifetime wealth is given by:

$$we = y + \frac{y'}{1+r} + x \left(1 - \frac{1}{1+r} \right)$$

Therefore, provided that $r > 0$, the consumer should take the advance, as any increase in his lifetime wealth makes him better off.



6. The consumer faces a borrowing constraint that places a ceiling on the level of current consumption. The consumer may consume more than the current endowment, $y - t$, but less than the amount of the lifetime endowment, w_e . The consumer's budget line is as in the first figure below. The budget line becomes vertical at $c = x$. An example of such a budget line is depicted in the two panels of the figure as ABD. As one possibility, the constraint is nonbinding as in the figure below. The consumer chooses point H. A change in the level of x has no effect on such a consumer.

Alternatively, the consumer depicted in the second figure below originally chooses the corner solution, point B. The consumer achieves the level of utility corresponding to indifference curve, I_1 . An increase in x produces the new budget line, ACJ. This consumer now chooses point G. She increases current consumption and decreases both current saving and future consumption. This consumer is able to improve her level of utility to that corresponding to indifference curve, I_2 .

