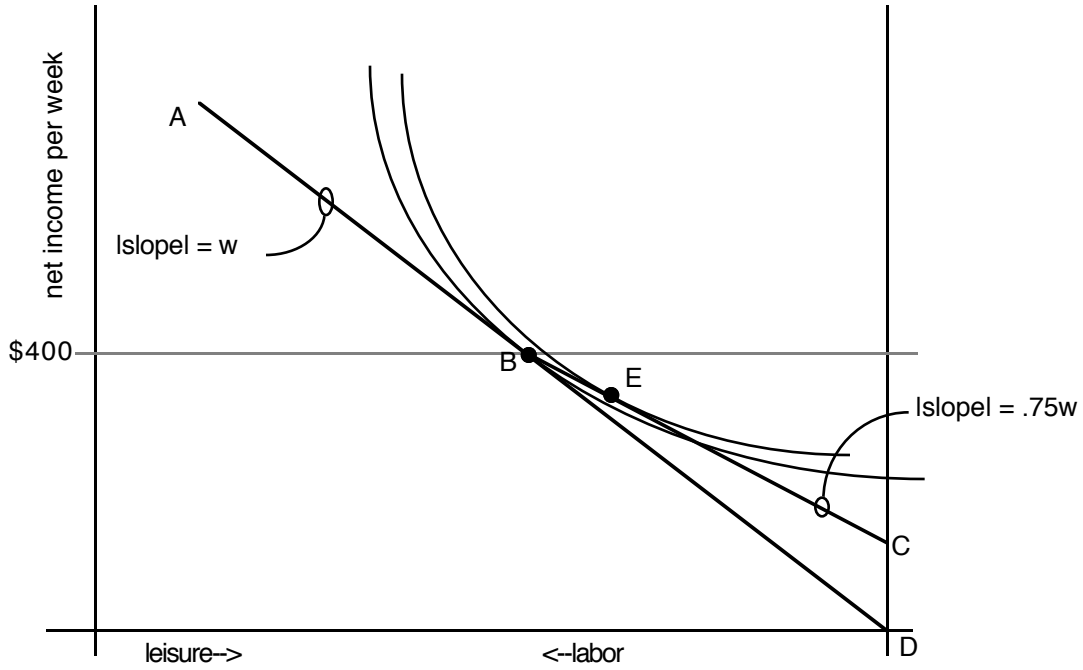
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ECONOMICS 131

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Answers to Problem Set #6

1. Taxation and Labor Supply



a. Hours are measured on the horizontal axis: leisure left to right and labor right to left. The budget set is the line ABD with a slope of -w.

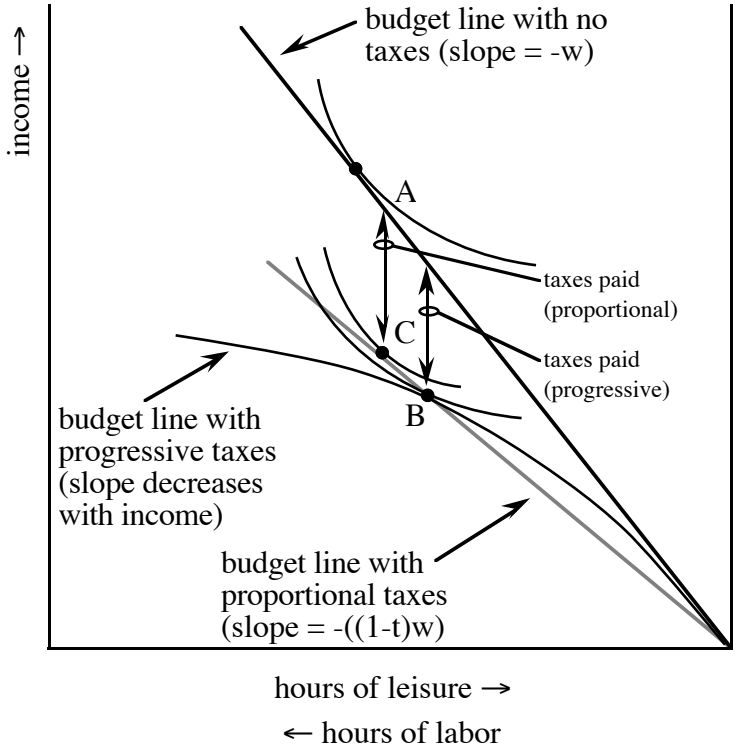
b. George's indifference curve is tangent at point B, where his earnings are $400/week.

c. If he does not work, he receives $100/week, which is the distance CD. As he faces an implicit tax rate of t=.25, the slope of the budget line is -(1-t)w = -.75w, up to point B where the entire negative income tax (NIT) is eliminated (25% of the $400 earnings is $100, the entire amount of the grant). After that point, the individual receives his full wage w without the implicit tax, so the budget line is kinked at B and has a slope of -w thereafter. The budget line under the NIT is thus CBA.

d. George's new labor supply will be at point E, the tangency of the new budget set with an indifference curve. Labor supply will decrease because

the BC segment of the new budget set cuts his old indifference curve, and he can move to a higher indifference curve by moving to the part of the BC segment which is above the old indifference curve. In contrast, the AB segment of the budget set remains below the original indifference curve.

2. Incentives and Progressive Income Taxation



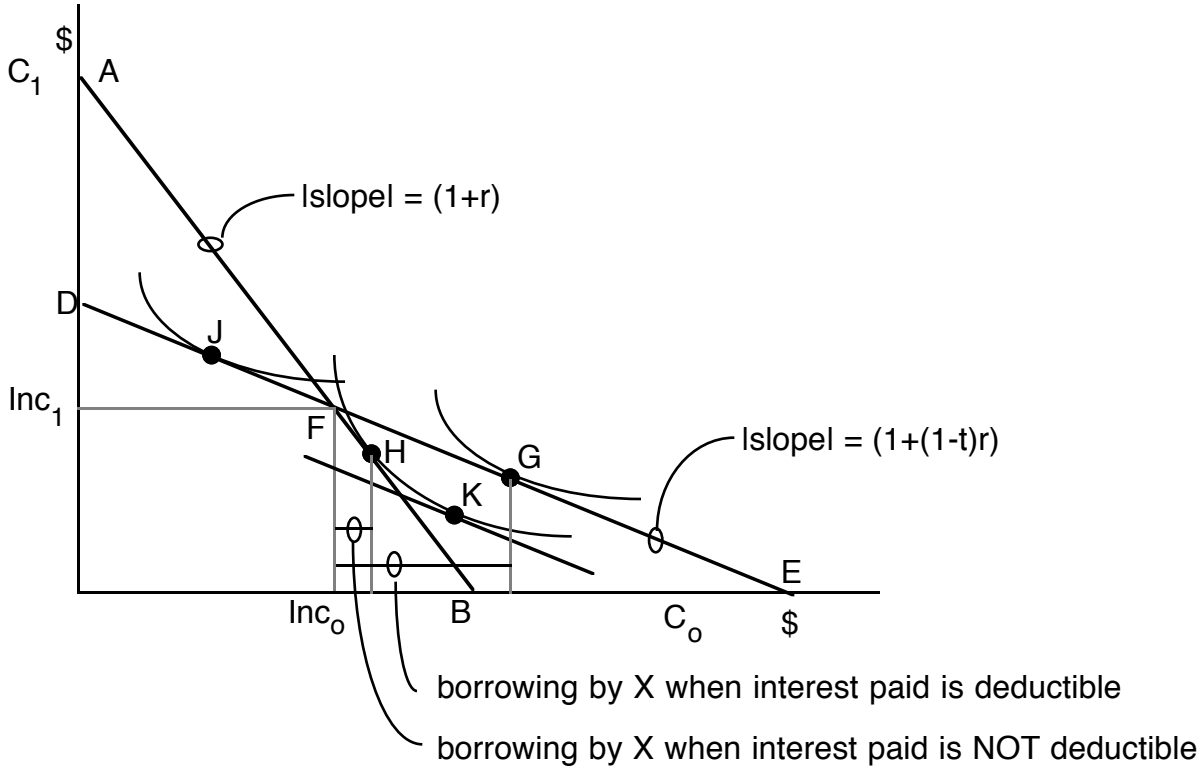
a. The horizontal axis in the diagram above measures hours of leisure from the left and hours of labor from the right (the total horizontal distance is total available hours). Because the individual earns w dollars for each hour of labor (hour of leisure forgone), the budget line has slope -w as shown beginning with zero income for zero hours of labor. The individual chooses point A, where an indifference curve is tangent to the budget line.

b. With a progressive tax the budget line begins at the same point as before but curves down more and more as income increases. This is because the slope of the budget line is -(1-t)w, where t is the (increasing) marginal tax rate. Again, the individual chooses the point where an indifference curve is tangent to the budget line (point B). The tax paid is the vertical distance between point B and the no-tax budget line (which represents the income that would be available with those hours of work if there were no taxes).

c. Because the tax is to raise the same revenue from this individual if work effort were unchanged, it must still go through point B. Since it is proportional, at must be a straight line, as shown. (The slope is -(1-t)w, where t is the constant marginal and average tax rate.)

(i) Since the new budget line cuts the old indifference curve, the worker will move to point C where work effort is increased; (ii) this puts the worker on a higher indifference curve, so utility increases; finally, (iii) taxes paid (the vertical distance between point C and the no-tax budget line) increase as well, since the no-tax budget line is steeper than the budget line with the tax.

3. Saving and the Taxation of Interest Income



a. In a two-period consumption diagram with consumption this year (say) on the horizontal axis (C_o) and consumption next year on the vertical axis (C_1), the budget line goes through point F where each year's consumption equals that year's income. [If earned income (as well as interest) were taxed, then point F would be the point where each year's consumption equals that year's *after-tax* income.]

To the left of that point this year's consumption is less than income (saving); being to the right represents borrowing. Absent taxes, the budget line is AB (with slope -(1+r)), reflecting the interest rate r. If interest received is taxable and interest paid is deductible, the net interest rate is (1-t)r, where t is the marginal tax rate. Then the after-tax budget line is DE with slope -(1+(1-t)r). A typical borrower (X) is shown with the indifference curve tangent at point G; a typical saver (Y) is shown with a tangency at point J.

b. If interest paid were not deductible, the budget line is DFB—the same as in part (a) for savers (whose interest income is still taxed) and the same as with no tax for borrowers (whose interest expenses are nondeductible). As the saver's segment of the budget line is unaffected, he stays at point J.

The borrower, on the other hand, will now face the new budget line segment FB:

Income Effect (G → K): reduced real income leads to reduced consumption (if consumption is a normal good) and therefore reduced borrowing.

Substitution Effect (K → H): the increased cost of borrowing also leads to reduced borrowing.

Total Effect (G → H): the total effect is therefore reduced borrowing, as shown.