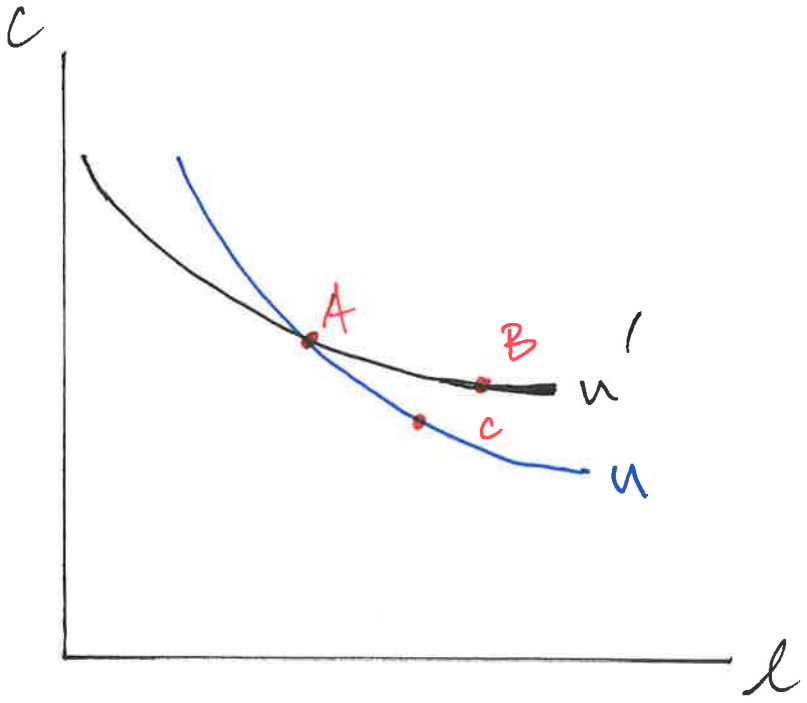
Economics 460: Labor Economics

Department of Economics, Finance and Legal Studies
University of Alabama
Spring, 2018

Midterm I

The exam is worth 100 points. Each question (eight questions on eight pages) is of equal value. There will be no communication with the exam proctors; if you believe a question contains an error or ambiguity, say so on your written examination, make an assumption to correct the alleged error or to resolve the ambiguity, and answer the question as well as you can.

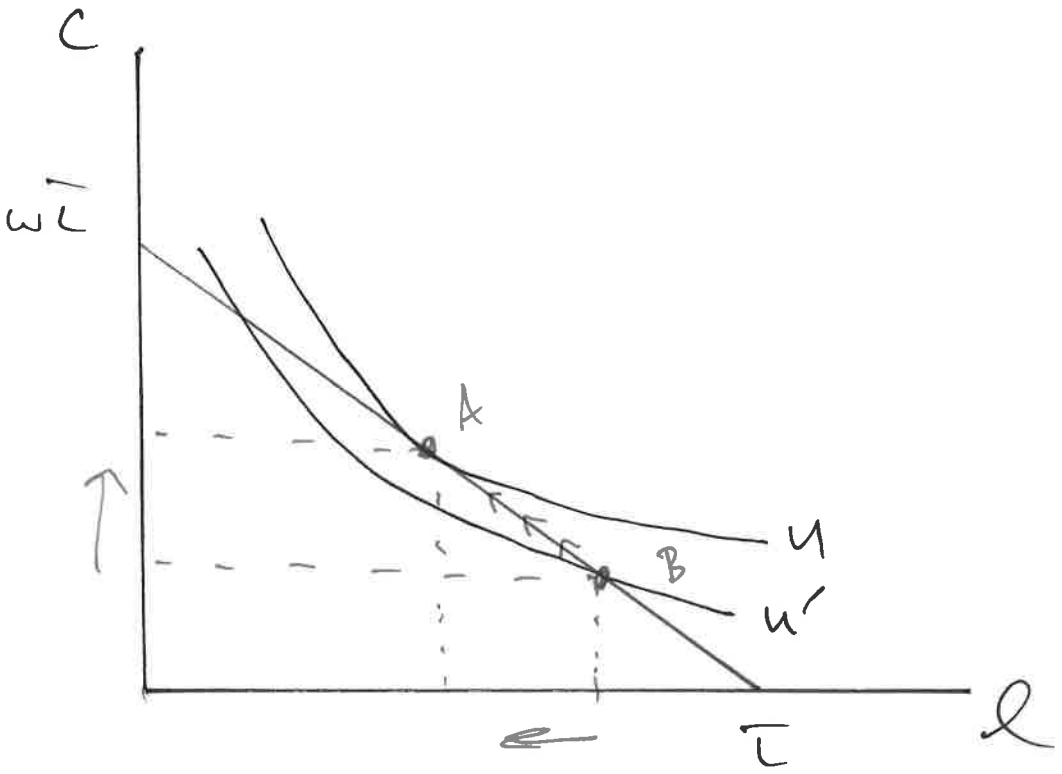
1. Consider an individual who chooses between consumption and leisure. For a utility function $u = u(c, l)$, show why indifference curves cannot cross. Use a graph and explain briefly.



$A \sim B \wedge A \sim C \Rightarrow B \sim C$, but

$B > C$ as more is better

2. The marginal rate of substitution (MRS) of consumption (vertical axis) for leisure (horizontal axis) measures the amount of consumption that must be received in order to absorb the loss of 1 unit of leisure without losing utility (do not assume that these goods are perfect substitutes). If that value is 1, if the price of consumption is 1 (our assumption from class), and if the wage is 2, then the consumer is not maximizing their utility. Sketch a budget line and draw in a possible indifference curve that illustrates the situation described here. Then, on the same graph, show what could be done to correct the problem, and briefly explain why this will work.



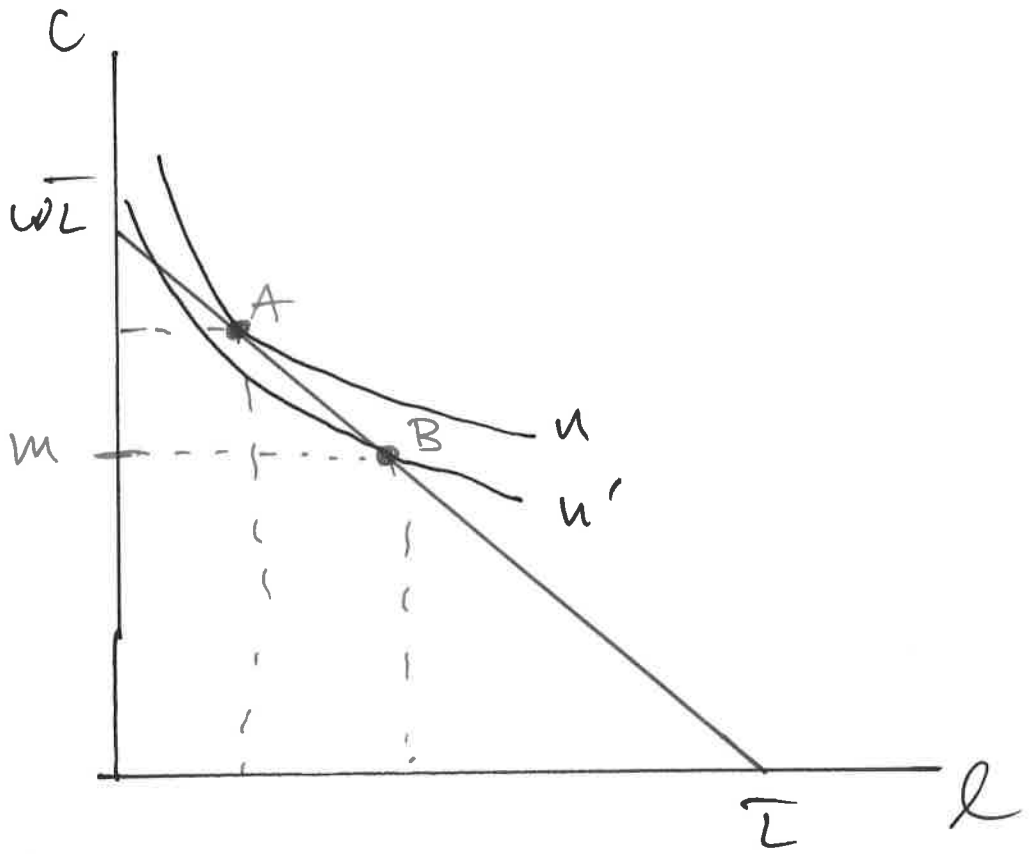
$MRS = \frac{mu_l}{mu_c}$ $\quad 2 > 1 = MRS$

$\downarrow l \Rightarrow \uparrow mu_l$ & $\uparrow c \Rightarrow \downarrow mu_c$

which should continue until

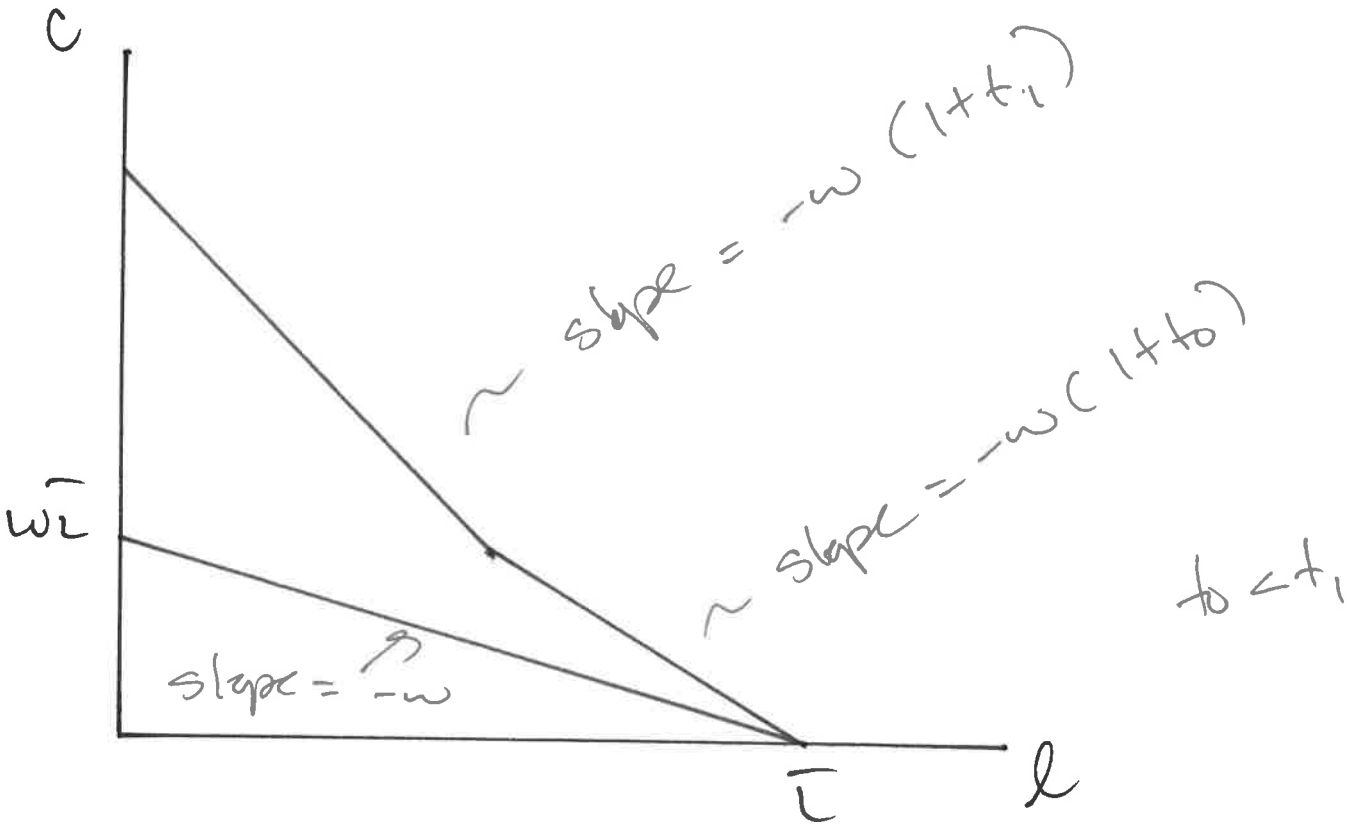
$MRS = 2$

3. Consider an individual who chooses between consumption and leisure. Suppose the government imposes a "maximum consumption level" M which is strictly less than $w\overline{L}$ (i.e., the level of consumption if the individual chooses no leisure). On a graph, show a case where an individual is made worse off by this policy. What happens to the amount of labor supplied by the individual?



A max utility, B is on the budget constraint but u' is lower, this leads to more l & hence less L than is optimal for the individual

4. Suppose the government wishes to institute a program to encourage people to work. They consider offering a credit per dollar earned until a given level (call it M) and after that point they begin offering an even larger credit per dollar earned with no maximum. On a graph, draw the budget constraint both with and without the government program. Using income and substitution effects, discuss the implication on labor supply.



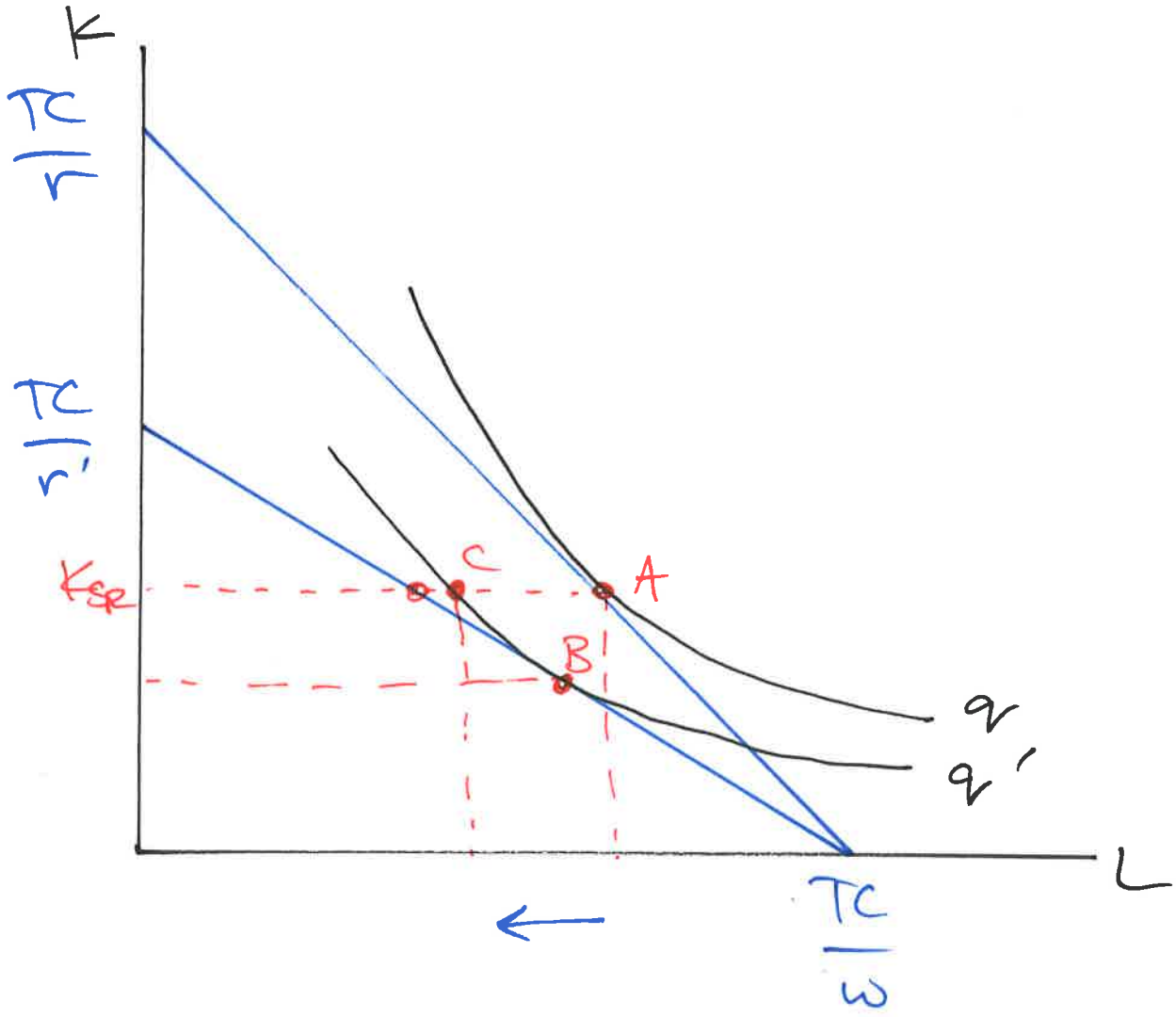
SE: to $\uparrow t_1$ $\uparrow$ price of leisure

$\Rightarrow \downarrow l$

IE: shift out in BC $\Rightarrow \uparrow$ in normal good (leisure)

outcome is ambiguous

5. Suppose a firm is maximizing profits in the short run with variable input labor (L) and fixed input capital (K). If the price of K (i.e., the rental rate, r) goes up, what happens to the firm's use of L? What happens to the firm's level of profits?



6. Suppose a firm faces a short-run production function $q\left(\overline{K}, L\right) = \frac{1}{2}L^2$, the price of the good is $p = 1$ and the wage rate $w = 1$. If the firm hires 3 workers, is it maximizing profits? If so, how? If not, what should it do?

profit max condition in the SR

$$w = p \cdot MP_L$$

$$MP_L = \frac{\partial q(\bar{K}, L)}{\partial L}$$

$$= 2 \cdot \frac{1}{2} L^{2-1}$$

$$= L$$

$$1 \stackrel{?}{=} 1 \cdot L$$

if $L = 3$, then

$1 < 1 \times 3$ no!

$\Rightarrow \downarrow L$ until $L = 1$

7. Suppoose the hourly wage (w) is \$1 and the price of each unit of capital (r) is \$2. The price of output (p) is constant at \$10 per unit. The production function is

$$q = K + L$$

assuming the both the current capital and labor stock are *variable*, what can be said about the firms input choice mix?

the price of the output is irrelevant

$MP_L = MP_K = 1$

these inputs are perfectly substitutable and hence the firm will only hire labor as $w < r$

8. Consider improvements in artificial intelligence (AI). If we think of AI as a capital good, how would the elasticity of demand for labor be affected by this? Explain briefly using Marshall's Rules of Derived Demand.

we can think of improvements in AI as making K & L more substitutable

if so $\uparrow e_{K,L} \Rightarrow$ make labor demand more elastic