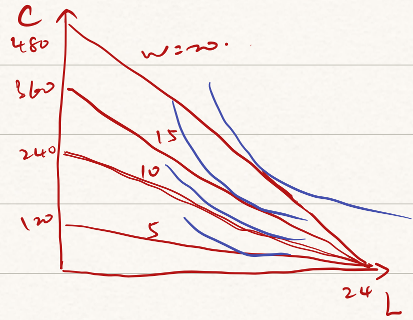
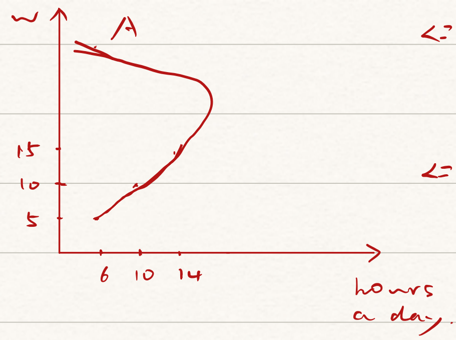
Labour - Leisure

- single good, quantity C
- leisure in hours L
- utility $u(L, C)$
- life of good l
- price of leisure w.
- budget: $C + wL = 24w$

$$C = (24 - L)w$$



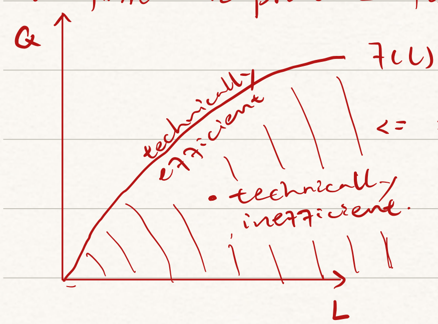
labour supply if $L(w)$ is optimal leisure chosen for any wage w. then $N(w) = 24 - L(w)$ is labour supply.



<= this graph comes from the intersections in the graph above.

<= left-bending curve.

Firms are defined by a production function the maximum quantity a firm can produce for a given set of inputs $f(L, k) = Q$.



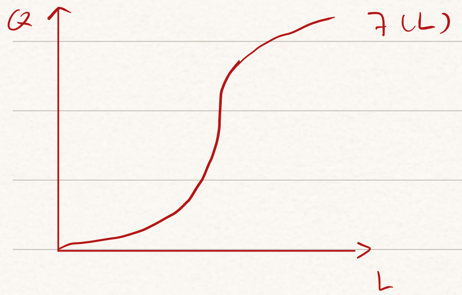
<= production sets

One input: L

total production function $f(L)$

average production function : $\frac{f(L)}{L}$

marginal productivity : $MP_L = \frac{d f(L)}{dL}$



$f(0) = 0$

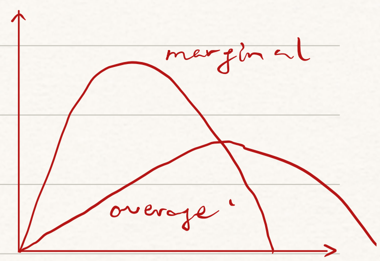
slope of the line from $(0,0)$ to $(L_1, f(L_1))$.

Relationship between Average and Marginal

if marginal is higher than average, average is increasing.

else average is decreasing.

average products peak if marginal product equal to average product.



2 inputs : L, k.

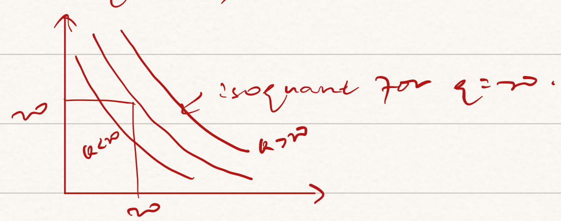
Ex: $f(L,k) = \sqrt{Lk} = L^{\frac{1}{2}} k^{\frac{1}{2}}$

think in terms of isoquant curves. the combination of L and k such that $f(L,k) = Q_0$ for some quantity $Q_0 \geq 0$.

Take $Q_0 = 20$: $\sqrt{Lk} = 20$

$Lk = 20^2 = 400$

$k = 400/L$.



slope of an isoquant describe how much capital a firm can give up when they increase labour a small amound and keep production the same, called marginal rate of technical substitution ($MRTS_{LK}$)

$MRTS_{LK} = \frac{MP_L}{MP_K}$ | e.g. $MRTS_{LK} = \frac{K}{L}$

Return to scale.

how does output change when we scale all inputs by the same factor? Take any L, K, this give output $Q = f(L, K)$.

scale input by $\lambda > 1$, inputs become $(\lambda L, \lambda K)$. Then $f(\lambda L, \lambda K) = zQ$.

If $\lambda > z$, we have decrease return to scale

$\lambda < z$, increasing

$\lambda = z$ unchanged.

Ex: Cobb-Douglas: $f(L, K) = A L^{\alpha} K^{\beta}$, $A, \alpha, \beta > 0$

$$= A \lambda^{\alpha} L^{\alpha} \lambda^{\beta} K^{\beta} = \lambda^{\alpha+\beta} f(L, K)$$

$$\Rightarrow z = \lambda^{\alpha+\beta}.$$

	>1	$\nearrow$
$\alpha+\beta$	$=1$	$-$
	<1	$\searrow$.