$u(x,y) = x^a y^b$

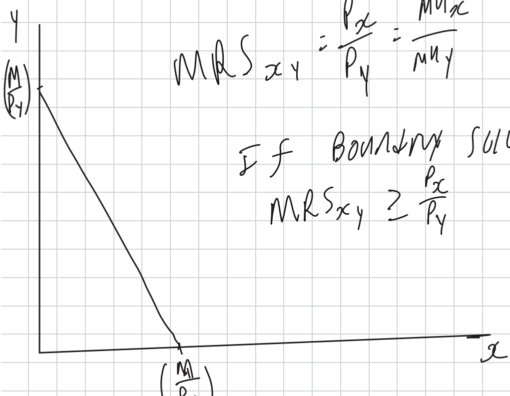
$MRS_{xy} = \frac{a}{b}\left(\frac{y}{x}\right) \Rightarrow$ Cobb Douglas

$xP_x + yP_y = M$

$y = \frac{M - xP_x}{P_y}$

Interior

$MRS_{xy} = \frac{P_x}{P_y} = \frac{MU_x}{MU_y}$



Exterior

If Boundary solution $\left(\frac{M}{P_x}, 0\right)$

$MRS_{xy} \geq \frac{P_x}{P_y}$ vice versa

$$E^d_x = \frac{\left(\frac{P_x}{x}\right)}{\left(\frac{dx}{dP_x}\right)} = \frac{\left(\frac{\partial x}{x}\right)}{\left(\frac{\partial P_x}{P_x}\right)}$$

$<1 \Rightarrow$ Inelastic

$>1 \Rightarrow$ Elastic

Engel Curve

$\frac{dx}{dM} > 0$

$M\uparrow \quad x\uparrow \Rightarrow$ Normal Good

$M\downarrow \quad x\uparrow \Rightarrow$ Inferior Good

Dominance

Look for a strat. that is best for player, no matter what the opponent is doing

Pure NE

Look for a strat that is best for each player given what the opponent is doing

Mixed NE: look for probability expected payoffs, BR

Ann \ Bob	Bob (q) H	(1-q) t
(p) H	3,5	1,1
(1-p) t	0,0	5,3

Ann Payoff

H: $3q + 1(1-q) = 1 + 2q$

t: $0q + 5(1-q) = 5 - 5q$

$1 + 2q = 5 - 5q \Rightarrow q = \frac{4}{7}$

Bob Payoff

H: $5p + 0(1-p) = 5p$

t: $1p + 3(1-p) = 3 - 2p$

$5p = 3 - 2p$

$p = \frac{3}{7}$

Mixed NE: $(p, q) = \left(\frac{3}{7}, \frac{4}{7}\right)$

Expected payout $\Rightarrow$ plug p or q $\Rightarrow 5\left(\frac{3}{7}\right) = 2.14$

$u(x,y) = u = 3\sqrt{x} + \frac{1}{2}y$

$MU_x = \frac{3}{2\sqrt{x}}$ $\quad MRS_{xy} = \frac{MU_x}{MU_y} = \frac{\frac{3}{2\sqrt{x}}}{\frac{1}{2}} = \frac{3}{\sqrt{x}}$

$MU_y = \frac{1}{2}$

Suppose $M = 12$, $P_x = 3$, $P_y = 1$. Let P_x vary

$xP_x + yP_y = 12$

$3x + y = 12$

$\frac{MU_x}{MU_y} = \frac{P_x}{P_y} \Rightarrow \frac{3}{1} = \frac{3}{\sqrt{x}}, \ x = 1$

So, $3(1) + y = 12$

$y = 9$

O.C: $(1, 9)$

When P_x varies

$P_x = MU_x$, $\quad P_x = \frac{3}{2\sqrt{x}}$, $\quad x = \frac{9}{P_x^2}$,

Budget Gives us $\quad y = 12 - \frac{9}{P_x^2}(P_x)$

$12 - \frac{9}{P_x} \geq 0$, $P_x = \frac{3}{4}$

If $P_x \geq \frac{3}{4}$

$\left(\frac{9}{P_x^2}, 12 - \frac{9}{P_x}\right)$

else $\Rightarrow \left(\frac{12}{P_x}, 0\right)$

For feasibility, use varying values in B.L. Equation