#1) 2 goods b, c

$P_b = 2$, $P_c = 6$, $m = 30$

a) $P_b \cdot b + P_c \cdot c = 30$

$2b + 6c = 30$

b) $b = f(c)$

$2b + 6c = 30$

$2b = 30 - 6c$

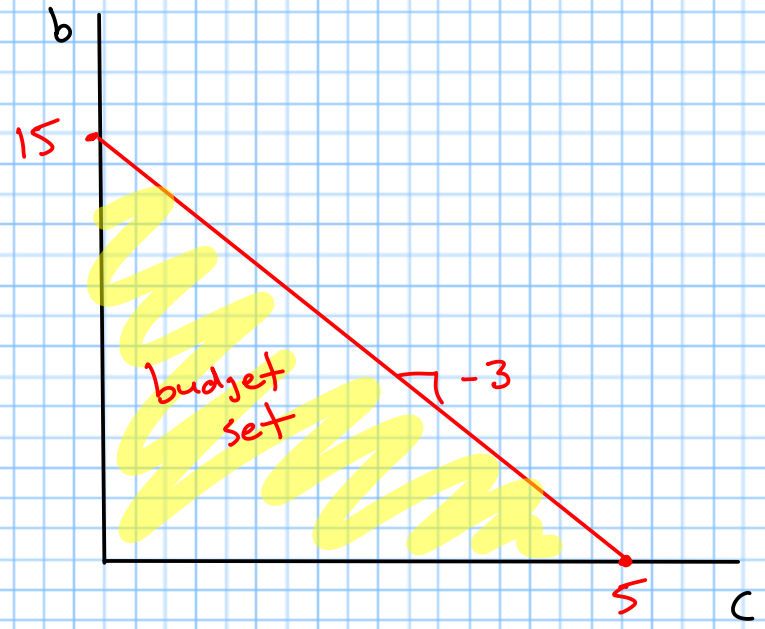
$b = 15 - 3c$

slope: -3

↪ opportunity cost

increase consumption of c by 1 unit, we must give up 3 units of b

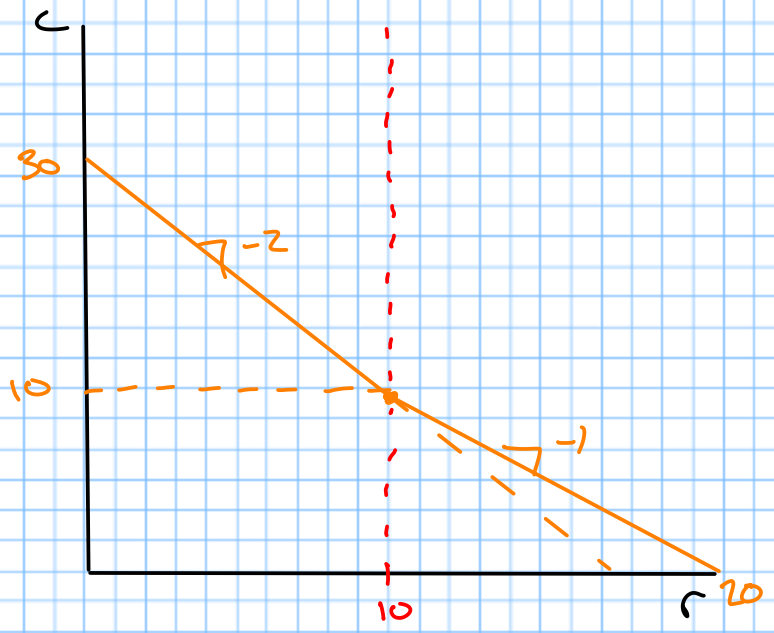
c)



#2) 1st 10 lbs → \$2/lb

after 10 lbs → \$1/lb

$m = 30$

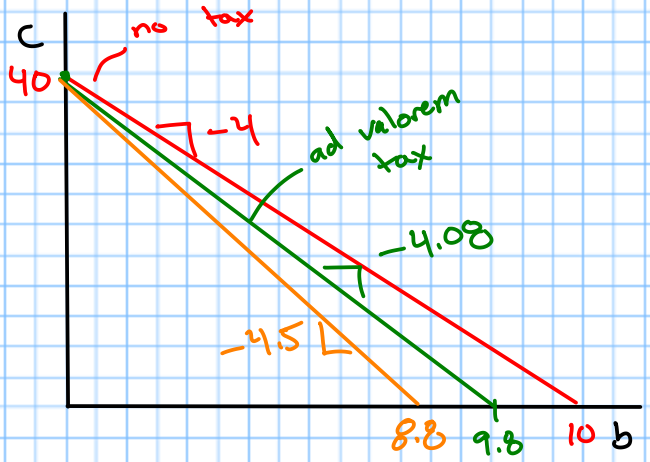


Equation

$$\begin{cases} 2r + c = 30 & \text{if } r \le 10 \\ r + c = 20 & \text{if } r > 10 \end{cases}$$

#3) $P_b = 4$, $m = 40$

a) $P_b \cdot b + c = 40$



b) ad valorem tax 2%

$(1.02 \cdot 4)b + c = 40$

$\frac{40}{1.02 \cdot 4} = \frac{10}{1.02} = 9.8$

c) Quantity tax \$0.50

$4.5b + c = 40$

price per b: $4 + 0.50$

$\frac{40}{4.5} = 8.8$

#4) Rationality assumptions

① Completeness
- We can compare any two bundles

② Transitivity
- Preferences are "consistent"
- $X \succ Y$ and $Y \succ Z$ then $X \succ Z$

③ Reflexivity
- We are indifferent between identical copies of bundles ($X \sim X$)

Well-behaved assumptions

① Monotonicity
- More is better

② Convexity
- Mixtures are preferred to extremes

#5) $W \succ X$
$X \succ Y$
$Y \sim Z$
$Z \succ W$

Are these rational preferences?

If these pref. were transitive:

$W \succeq X$, $X \succ Y$ $\}$ $W \succ Y$

$W \succ Y$, $Y \sim Z$ $\}$ $W \succ Z$

→ not transitive

→ not rational

#6) Find MRS

a) $u(x_1, x_2) = x_1' x_2'$

$$MRS = \frac{MU_1}{MU_2} = \frac{\frac{\partial u(x_1,x_2)}{\partial x_1}}{\frac{\partial u(x_1,x_2)}{\partial x_2}}$$

$MU_1 = 1 X_1^{1-1} X_2$

$= X_1^0 \cdot X_2$

$= X_2$

$MU_2 = X_1$

$MRS = \frac{X_2}{X_1}$

b) $u(x_1, x_2) = x_1^2 x_2^3$

$MRS = \frac{2X_2}{3X_1}$

$MU_1 = 2x_1 x_2^3$

$MU_2 = 3x_1^2 x_2^2$

$MRS = \frac{2 x_1 x_2^3}{3 x_1^2 x_2^2} = \frac{2X_2}{3X_1}$

c) $u(x_1, x_2) = x_1^{1/3} x_2^{2/3}$

$MRS = \frac{\frac{1}{3} X_2}{\frac{2}{3} X_1} = \frac{X_2}{2X_1}$

d) $u(x_1, x_2) = \frac{X_1}{X_2}$

$= X_1 X_2^{-1}$

$MRS = \frac{1 X_2}{-1 X_1} = -\frac{X_2}{X_1}$

$MU_1 = X_2^{-1}$

$MU_2 = -1 X_1 X_2^{-2}$

$MRS = \frac{X_2^{-1}}{-X_1 X_2^{-2}} = -\frac{X_2^2}{X_1 X_2} = -\frac{X_2}{X_1}$

#7) $u_m(g,c) = gc$

$MRS_m = \frac{c}{g}$

$u_L(g,c) = g^2c^2$

$MRS_L = \frac{2c}{2g} = \frac{c}{g}$

$u_L(g,c) = u_M(g,c)^2$

$(gc)^2 = g^2c^2$

MRS: rate we are willing to trade one good for another