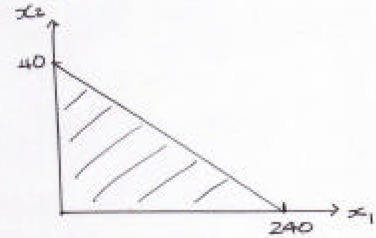
(1) Given $P_1 = 0.5$
$P_2 = 3$
$m = 120$

(a) Budget line: $0.5x_1 + 3x_2 = 120$

(b) Budget set: $0.5x_1 + 3x_2 \le 120$

(c)

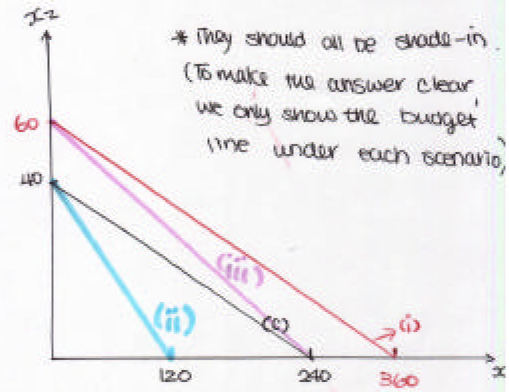


(d) (i) $0.5x_1 + 3x_2 \le 180$

(ii) $x_1 + 3x_2 \le 120$

(iii) $0.5x_1 + 2x_2 \le 120$

* They should all be shade-in.
(To make the answer clear, we only show the budget line under each scenario)

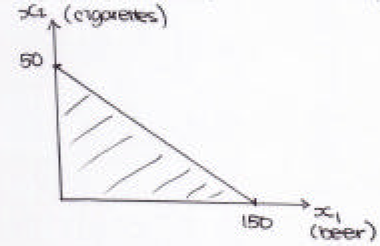


(e) The opportunity cost of an extra bottle of ice tea is 6 hotdogs

(2) Given x_1 = beer $\quad P_1 = 2 \quad m = 300$

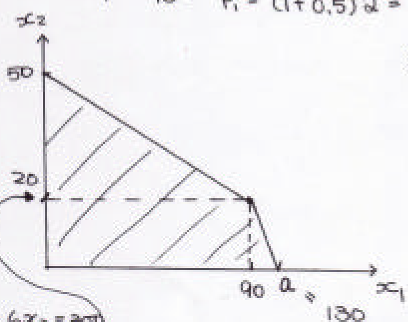
x_2 = cigarettes $\quad P_2 = 6$

(a) since Shirley can afford $\left(\frac{m}{P_2} = 50\right)$ packs of cigarettes at most, the ration of 55 packs has <u>NO EFFECT</u> on her budget set.



(b) for $x_1 \le 90$: $P_1 = 2$

$x_1 > 90$: $P_1 = (1+0.5)2 = 3$



$2(90) + 6x_2 = 300$

$6x_2 = 120$

$x_2 = 20$

a = maximum bottles of beer affordable under tax.

$2(90) + 3(a-90) = 300$

$3a - 270 = 120$

$3a = 390$

$\boxed{a = 130}$

(c) Not buy beer

(3) (a) Preferences are "Rational" if they satisfy all 3 of the following:
- complete
- transitive
- reflexive

(b) Preferences are "well-behaved" if they satisfy all 4 of the following:
- Rational
- strong monotonicity
- strict convexity
- Local Non-satiation

(c)
- Not Complete: If A is taller but poorer, and B is shorter but richer, given this preference ~~relationship~~ she will not be able to compare between A and B
- Transitive: If A is taller and richer than B, and B is taller and richer than C, then it must be true that A is taller and richer than C.

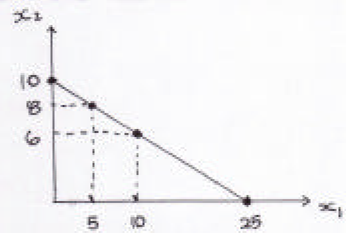
(4) Amy is always willing to substitute 5 apples (x_1) for 2 oranges (x_2)

suppose Amy is currently consuming (10, 6), we know that she will be indifferent if she gives up 5 apples but is compensated w/ 2 more oranges.

so examples of $(x_1, x_2) \sim (10,6)$

$\Rightarrow$ (5, 8), (0, 10), (10, 6), (15, 4) .....

Mathematically, any bundle that satisfy $2x_1 + 5x_2 = 50$ is on the same indifference curve as (10, 6)



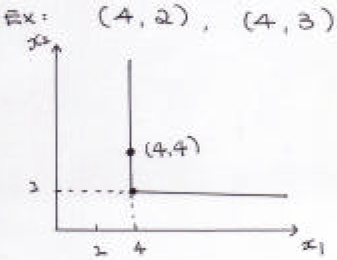
(5) Bob always consume 1 beer (x_1) and ½ bags of chips together (x_2).

$\Rightarrow$ Think of 1 beer & ½ bags of chips as "1 beer+chip combination" he consume.

$\Rightarrow$ Consider (4, 4) $\rightarrow$ Total of 4 beer+chip combination he'll consume. (4 beers go w/ 2 bags of chips, he has 2 bags left-over, it doesn't matter)

$\Rightarrow$ Any (x_1, x_2) that allows Bob to consume 4 beer+chip combination is equally as good as (4, 4)

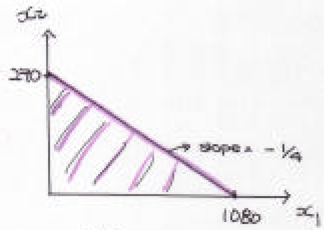
Ex: (4, 2), (4, 3), (5, 2), (6, 2) .....



※ Mathematically: Any (x_1, x_2) that satisfy $\min\{x_1, 2x_2\} = 4$ is on the same indifference curve as (4, 4)

Extra Credit Question

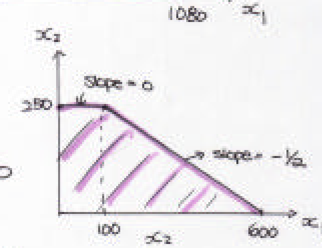
There are 3 options faced by Stan. First, let's treat them as completely separate.



$\boxed{\text{Plan A}}$: Budget set

$0.25x_1 + x_2 \le 300 - \underset{\text{Activation fee}}{30}$

$\Rightarrow 0.25x_1 + x_2 \le 270$



$\boxed{\text{Plan B}}$:

Budget set

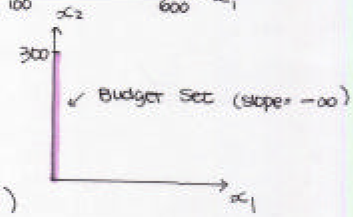
For $x_1 \le 100$: $x_2 \le 250$

For $x_1 > 100$: $0.5(x_1 - 100) + x_2 \le 250$

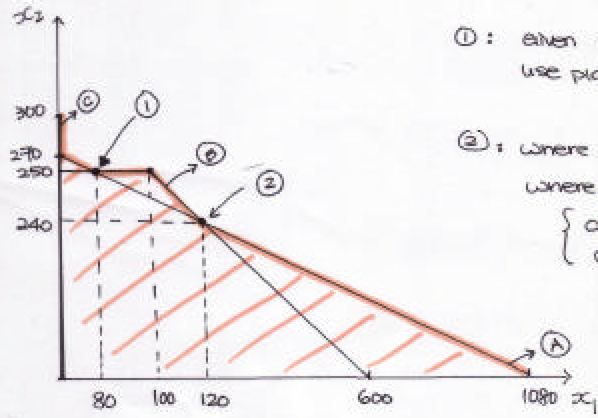
$\boxed{\text{Plan C}}$: Not enroll in any plan.

Stan then spend all his income on everything else.

His budget set: $x_2 \le 300$



* All feasible bundles for Stan (combine all 3)



①: given $x_2 = 250$

use plan A: $0.25x_1 + 250 = 270$

$x_1 = 80$

②: where $x_1 > 100$

where plan A & B intersect.

$$\begin{cases} 0.25x_1 + x_2 = 270 \\ 0.5(x_1 - 100) + x_2 = 250 \end{cases}$$

Solve for x_1 and x_2

$x_1 = 120$

$x_2 = 240$

ANS: