In-class problem: Consumer Theory

1) If Fred’s MRS of salad for pizza equals -5, then which of the following is true?

A) He would give up 5 pizzas to get the next salad.
B) He would give up 5 salads to get the next pizza.
C) He will eat 5 times as much pizza as salad.
D) He will eat 5 times as much salad as pizza.

The answer is B)

Notes: $MRS_{x\text{for}y} = \frac{dx}{dy}$, x is always on the top, while y on the bottom.

$MRS_{x\text{for}y} = \frac{dx}{dy} = -5$ which implies $-\frac{ds}{dp} = -5 \Rightarrow ds = -5dp$

The above equation says, to get one more unit of pizza, this consumer has to give up 5 units of salad.
So, B) is the correct answer.

2) Steven feels that coffee and tea are perfect substitutes. Due to caffeine levels, his MRS of tea for coffee equals -2. If coffee and tea sell for the same prices, how much tea and coffee Steven will consume?

Solution:
Step 1: Let’s do the budget constraint first:
Let $p_t$ denote price of tea, $p_c$ the price of coffee, and $Y$ the income of Steven.
Then the budget constraint (BC) is
$p_t t + p_c c = Y$
If we put tea on the y-axis, coffee on x-axis, then MRT, i.e., the slope of BC is
$MRT = -\frac{p_c}{p_t} = -1$ since $p_c = p_t = p$
Step 2 - Perfect substitute implies that the indifference curve for Steven is a straight line. To be able to draw this IC, we have to know the slope of IC, i.e., MRS. But we know $MRS_{y/x} = -2$, so we can draw any IC in the above diagram.

Step 3 - Now let’s move the IC. It is easy to see $IC_1$ gives the best utility. Since the intersection of BC and IC is at the intercept of x-axis, we know the optimal bundle will be $(\frac{Y}{P_x}, 0)$. And it is a corner solution.