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a,

h = ham  C = cheese

| h, C | $TU_h$ | $TU_C$ | $MU_h$ | $MU_C$ | $\frac{MU_h}{P_h}$ | $\frac{MU_C}{P_C}$ | choice | remaining budget |
|---|---|---|---|---|---|---|---|---|
| 1 | 15 | 12 | 15 | 12 | 15 | 12 | $h_1, C_1$ | 7 − 1 = 6 |
| 2 | 26 | 21 | 11 | 9 | 11 | 9 | $h_2, C_1$ | 6 − 1 = 5 |
| 3 | 35 | 29 | 9 | 6 | 9 | 6 | $h_2, C_2$ | 5 − 1 = 4 |
| 4 | 41 | 32 | 6 | 5 | 6 | 5 | $h_3, C_2$ | 4 − 1 = 3 |
| 5 | 45 | 35 | 4 | 3 | 4 | 3 | $h_3, C_3$ | 3 − 1 = 2 |
| 6 | 48 | 37 | 3 | 2 | 3 | 2 | $h_4, C_3$ | 2 − 1 = 1 |
| 7 | 49 | 38 | 1 | 1 | 1 | 1 | $h_4, C_4$ | 1 − 1 = 0 |

From the table chose 4 ham and 3 cheese will purchase to maximize her utility.

b. her utility will not be maximized if the condition that apple because she hasn't enough money for buy the product for the maximized utility.

a $MRS_{xy} = \frac{P_x}{P_y} = \left|\frac{\Delta y}{\Delta x}\right|$

$\frac{P_x}{10} = \left|\frac{9}{2}\right|$

$P_x = 45$

b. $\frac{I/P_y}{I/P_x} = \frac{P_x}{P_y}$

$\frac{9}{2} = \frac{180}{P_y}$

$P_y = \frac{180 \times 2}{9} = 40$

$I \geq P_x \cdot X + P_y \cdot y$

$I \geq 180 \times 4 + 40 \times 9$

$I \geq 720 + 360$

$I \geq 1080$

C. $MRS_{xy} = \frac{\Delta y}{\Delta x} = \frac{9}{4} = \frac{2.25}{1}$

when avocado change for 1 unit the nuts will change 2.25 unit.

D. $\left|MRS_{C \to D}\right| = \left|\frac{\Delta y}{\Delta x}\right| = \frac{MU_x}{MU_y} = \frac{9}{4} = 2.25$

$\left|MRS_{A \to B}\right| = \left|\frac{\Delta y}{\Delta x}\right| = \frac{MU_x}{MU_y} \quad \frac{9}{2} = 4.5$

From law of dimishing marginal utility when people consume more product the marginal unility will decrease so when total utility is increasing from 8→12 ($I_1 \to I_2$) the MRS will decrease from 4.5 to 2.25 because the marginal utility is decreasing.