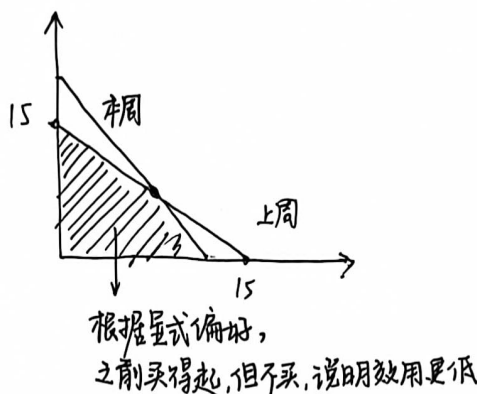
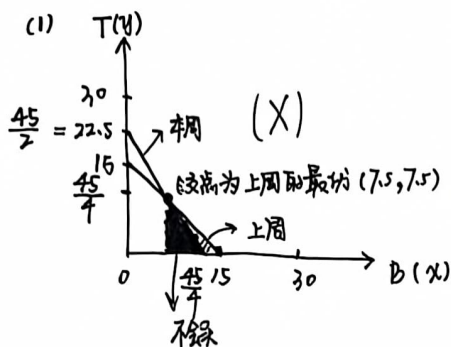


4. 上周 B T
 $p \ 2 \ 2$
 $num \ 7.5 \ 7.5$
 $C = 4 \times 7.5 = 30$
 $2x + 2y = 30$

本周 B T
 $p' \ 4 \ 2$
 $num \ 7.5 \ 7.5$
 $C = 6 \times 7.5 = 45$
 $4x + 2y = 45$



(2) 这里分析替代效应 (称为假 $\Delta p < 0$)

因为: $p_1'x + p_2y = p_1'x' + p_2y'$ (其中 (x', y') 为本周最优 bundle)

$(x, y) = (7.5, 7.5)$ 和 (x', y') 在 $C = 45$ 买得起

买了 (x', y') , 故 $C = 30$ 时买不起 (x', y') 即 $p_1x' + p_2y' > p_1x + p_2y$

即: ~~$p_1x + p_2y < p_1x' + p_2y'$~~

~~$x(p_1 - p_1') < p_2(y - y') = p_1'(x - x')$~~

$p_1(x' - x) > p_2(y - y') = p_1'(x' - x)$

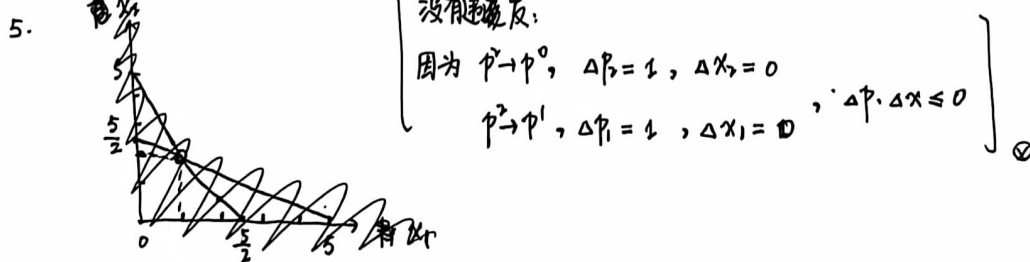
$(p_1' - p_1)(x' - x) < 0$

① ~~$m_0 = p_1x + p_2y$~~

② ~~$m_1 = p_1'x + p_2y = p_1'x' + p_2y'$~~

③ ~~$m_0 < m_1 \Leftrightarrow p_1x + p_2y < p_1'x' + p_2y'$~~

~~$p_1'x' + p_2y' < p_1x + p_2y$~~



违反了, 因为:

	p_1	p_2	x_1	x_2	m
case 0	1	2	1	2	5
case 1	2	1	2	1	5
case 2	1	1	2	2	4

此时也买得起 $x^1 \Rightarrow x^0 > x^1$
 买得起 $x^0 \Rightarrow x^1 > x^0$ } 矛盾! 违反了!

b. $m_0 = 16$, $u(w) = \sqrt{w}$

(a) 购买保险: $\begin{matrix} 90\% & 16-R \\ 5\% & 16-7-R=9-R \\ 5\% & 16-7-R=9-R \end{matrix}$ 故 $EU = 0.9 \times \sqrt{16-R} + 0.1 \times \sqrt{9-R}$

$$\begin{array}{r} 1.44 \\ 0.45 \\ 0.20 \\ \hline 2.09 \end{array}$$

(b) 不购买: $\begin{matrix} 90\% & 16 \\ 5\% & 9 \\ 5\% & 4 \end{matrix}$ $EU_2 = 0.9 \times 16 + 0.05 \times 9 + 0.05 \times 4$
 $= 1.44 + 0.45 + 0.2$
 $= 2.09$

$$\Delta: EU_2 = 0.9 \times \sqrt{16} + 0.05 \times \sqrt{9} + 0.05 \times \sqrt{4}$$

$$= 0.9 \times 4 + 0.05 \times 3 = 3.6 + 0.35 = 3.95$$

(c) $EU_1 \approx EU_2$

$R^* \approx 6.68$ 故 $R \leq 6.68$

7. (1)

$$2. A \left\{ \begin{matrix} 2500 & \frac{1}{2} \\ 400 & \frac{1}{2} \end{matrix} \right\} + (1-\alpha) \cdot B \left\{ \begin{matrix} 1600 & \frac{1}{2} \\ 900 & \frac{1}{2} \end{matrix} \right\}$$

A 的 EU : $EU_A = \frac{1}{2} \cdot 50 + \frac{1}{2} \cdot 20 = 35$

B 的 EU : $EU_B = \frac{1}{2} \cdot 40 + \frac{1}{2} \cdot 30 = 35$

$$\alpha A + (1-\alpha)B \text{ 的 } EU: EU(\alpha) = \frac{1}{2} \cdot \sqrt{2500\alpha + 1600(1-\alpha)} + \frac{1}{2} \cdot \sqrt{400\alpha + 900(1-\alpha)} = \frac{1}{2} \sqrt{1600 + 900\alpha} + \frac{1}{2} \sqrt{900 - 500\alpha}$$

$$\arg\max_{\alpha} EU(\alpha) = \arg\max_{\alpha} \frac{5(16 + 9\alpha - 9 + 5\alpha)}{\sqrt{16 + 9\alpha} - \sqrt{9 - 5\alpha}} = 5(\sqrt{16 + 9\alpha} + \sqrt{9 - 5\alpha})$$

$$= \arg\max_{\alpha} \frac{5(7 + 4\alpha)}{\sqrt{16 + 9\alpha} - \sqrt{9 - 5\alpha}}$$

$$\frac{dEU(\alpha)}{d\alpha} = \frac{5}{2} \left(\frac{9}{\sqrt{16 + 9\alpha}} - \frac{5}{\sqrt{9 - 5\alpha}} \right) = 0 \Leftrightarrow \alpha^* = \frac{47}{90}$$

(2) 买保险收益: $\frac{1}{2} \cdot \sqrt{2500 - 400} + \frac{1}{2} \sqrt{400 - 400 + 800} = \frac{1}{2} \sqrt{2100} + \frac{1}{2} \sqrt{800} = 5(\sqrt{21} + \sqrt{8}) \approx 37.05$

即 $EU(\frac{47}{90}) = 35.37$

买保险更好!