4. 上周 B T

P 2 2

num 7.5 7.5

$C = 4\times7.5 = 30$

$2x+2y=30$

本周 B T

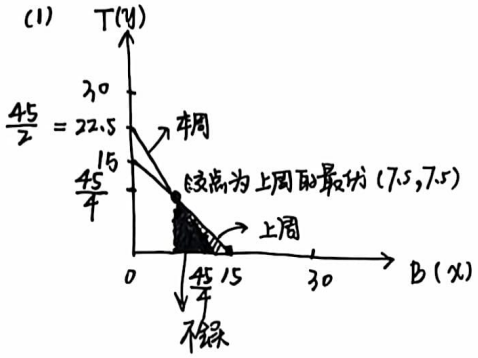
P' 4 2

num 7.5 7.5

$C = b\times7.5 = 45$

$4x+2y=45$

(1) T(y)



(2) 这里分析替代效应 (未为假如 $\Delta p\Delta x<0$)

因为: $P_1'x + P_2y = P_1'x' + P_2'y'$ (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 $P_1x'+P_2y' > P_1x+P_2y$

$P_1(x'-x) > P_2(y-y') = P_1'(x'-x)$

$(P_1'-P_1)(x'-x)<0$

~~即: $P_1x+P_2y < P_1'x'+P_2y'$~~

~~$x'(P_1-P_1') < P_2(y'-y) = P_1'(x-x')$~~

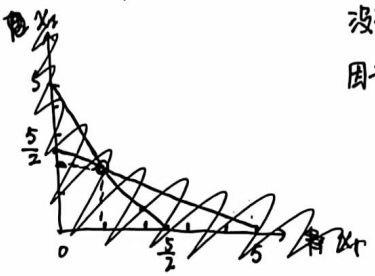
~~① $m_0 = P_1x+P_2y$~~

~~② $m_1 = P_1'x+P_2y \equiv P_1'x'+P_2y'$~~

~~③ $m_0 < m_1 \Leftrightarrow P_1x+P_2y < P_1'x'+P_2y'$~~

~~$P_1'x'+P_2y' < P_1x+P_2y$~~

5.



没有违背反:

因为 $P^1 \to P^0$, $\Delta P_2 = 1$, $\Delta x_2 = 0$

$P^2 \to P^1$, $\Delta P_1 = 1$, $\Delta x_1 = 1$

$\therefore \Delta P \cdot \Delta x \leq 0$

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

(a) 购买保险：

	w
90%	$16-R$
5%	$16-7-R=9-R$
5%	$16-7-R=9-R$

故 $EU_1 = 0.9\times\sqrt{16-R} + 0.1\times\sqrt{9-R}$

1.44
0.45
0.20
2.09

(b) 不购买：

90%	16
5%	9
5%	4

$EU_2 = 0.9\times 16 + 0.05\times 9 + 0.05\times 4$
$= 1.44 + 0.45 + 0.2$
$= 2.09$

(c) $EU_1 \geq EU_2$

$R^* \approx 6.68$ 故 $R \leq 6.68$.

7. (1)

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

A 的 EU：$EU_A = \frac{1}{2}\cdot 60 + \frac{1}{2}\cdot 20 = 35$

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

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

$$\underset{\alpha}{\operatorname{argmax}}\, EU(\alpha) = \underset{\alpha}{\operatorname{argmax}}\, \frac{5(16+9\alpha-9+5\alpha)}{\sqrt{16+9\alpha}-\sqrt{9-5\alpha}} \qquad = 5\left(\sqrt{16+9\alpha}+\sqrt{9-5\alpha}\right).$$

$$= \underset{\alpha}{\operatorname{argmax}}\, \frac{5(7+4\alpha)}{\sqrt{16+9\alpha}-\sqrt{9-5\alpha}}$$

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

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

而 $EU(\frac{47}{90}) = 35.39$

故购买保险！