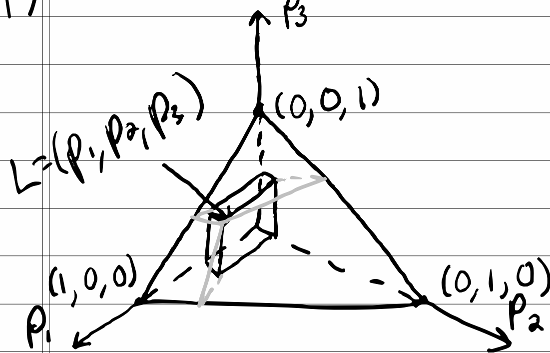
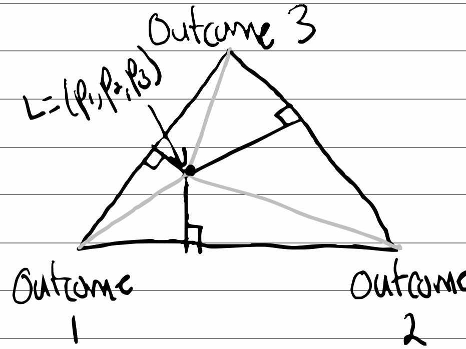
PS #5

1)





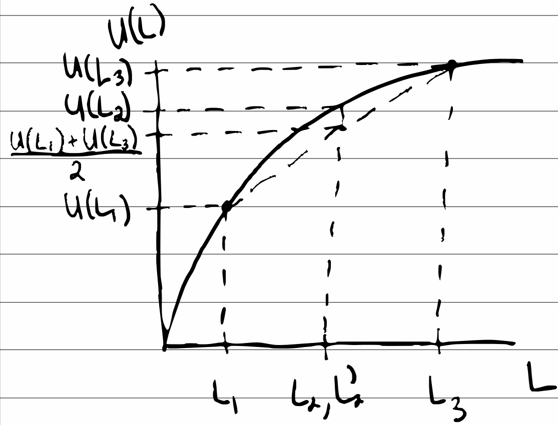
- each side of the simplex has length $\sqrt{2}$
- we can use this, and additional geometric property to show the sum of the line segments intersecting at L equals $\sqrt{6}/2$ which is greater than 1 (not equal to 1)

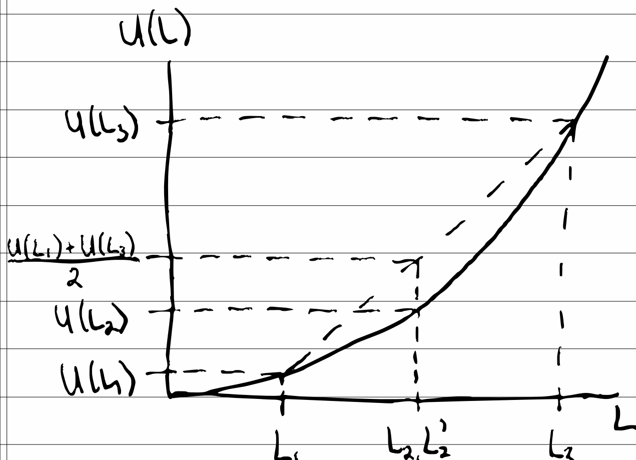
- use the diagram on the left to show the line segments projected onto the simplex are proportional to the probabilities in L

2a) $L_2 \succsim L_2'$ if $U(L)$ is concave

b) $L_2' \succsim L_2$ if $U(L)$ is convex

c)





3a) Two choices: delivery or pick up

Outcomes:

1) hot and \$12
2) cold and \$0
3) hot and \$10
4) hot and \$0
5) cold and \$10
6) cold and \$0

$4 \succ 3 \succ 1$, $2 \sim 6 \succ 5$ } holding temp constant

$4 \succ 2 \sim 6$, $3 \succ 5$ } holding price constant

b) Lottery for delivery (D):

Probability	Outcome
49/50	hot and \$12
1/50	cold and \$0

Lottery for pick up (P):

Probability	Outcome
891/1000	hot and \$10
9/1000	hot and \$0
99/1000	cold and \$10
1/1000	cold and \$0

c) No, you need more information to determine your preferences over these lotteries; particularly, the utilities for each outcome

d) We know if the conditions for the expected utility theorem are met, we must have:

$$D \succsim P \text{ iff } \sum_{n=1}^{2} u_n^D p_n^D \geq \sum_{n=1}^{4} u_n^P p_n^P$$

You can assign any utilities, which are consistent with preferences in part c, and such that $u_1^D p_1^D + u_2^D p_2^D \geq u_1^P p_1^P + u_2^P p_2^P + u_3^P p_3^P + u_4^P p_4^P$

e) Similar to part d), we must have:

$$P \succsim D \text{ iff } \sum_{n=1}^{4} u_n^P p_n^P \geq \sum_{n=1}^{2} u_n^D p_n^D$$

You can assign any utilities, which are consistent with preferences in part c, and such that $u_1^P p_1^P + u_2^P p_2^P + u_3^P p_3^P + u_4^P p_4^P \geq u_1^D p_1^D + u_2^D p_2^D$

f) Similar to part d), we must have:

$$D \sim P \text{ iff } \sum_{n=1}^{2} u_n^D p_n^D = \sum_{n=1}^{4} u_n^P p_n^P$$

You can assign any utilities, which are consistent with preferences in part c, and such that $u_1^D p_1^D + u_2^D p_2^D = u_1^P p_1^P + u_2^P p_2^P + u_3^P p_3^P + u_4^P p_4^P$