ECN 106 : Decision Making Professor Giacomo Bonanno

WINTER 2024 - FIRST MIDTERM EXAM: ANSWERS for VERSION 2

1. **(a)** **(a.1)** *e* strictly dominates *d*, *f* strictly dominates *d* and *e*.

(a.2) The Maximin solution is *f*.

(b) **(b.1)** (*d*,*e*): *e* strictly dominates *d*.

(*d*,*f*): *f* strictly dominates *d*

(*e*,*f*): it is neither the case that *e* dominates *f* (because $z_{12} \succ z_8$ and thus *f* is better than *e* in state s_4) nor the case that *f* dominates *e* (because $z_5 \succ z_9$ and thus *e* is better than *f* in state s_1).

(b.2) The Maximin solution is *e*.

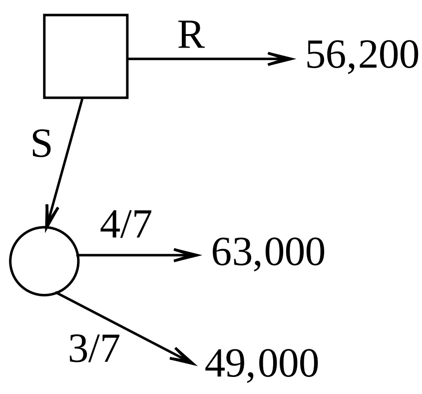
(c) **(c.1)** (*d*,*e*): *d* weakly dominates *e*.

(*d*,*f*): it is neither the case that *d* dominates *f* (because $z_9 \succ z_1$ and thus *f* is better than *d* in state s_1) nor the case that *f* dominates *d* (because $z_2 \succ z_{10}$ and thus *d* is better than *f* in state s_2).

(*e*,*f*): it is neither the case that *e* dominates *f* (because $z_9 \succ z_5$ and thus *f* is better than *e* in state s_1) nor the case that *f* dominates *e* (because $z_6 \succ z_{10}$ and thus *e* is better than *f* in state s_2).

(c.2) The Maximin solution is *d*.

2. The expected value of the lottery $\begin{pmatrix} 25,000 & 64,000 \\ \frac{1}{5} & \frac{4}{5} \end{pmatrix}$ is 56,200; the expected value of the lottery $\begin{pmatrix} 9,000 & 81,000 \\ \frac{1}{4} & \frac{3}{4} \end{pmatrix}$ is 63,000 and the expected value of the lottery $\begin{pmatrix} 16,000 & 100,000 \\ \frac{3}{4} & \frac{1}{4} \end{pmatrix}$ is 37,000. Thus the decision tree can be reduced as follows:



The expected value of the lottery $\begin{pmatrix} 49,000 & 63,000 \\ \frac{3}{7} & \frac{4}{7} \end{pmatrix}$ is 57,000. Thus the decision maker will choose *S*. The full backward-induction solution is (*S*, *A*, *E*).

3. **(a)** Being risk neutral, Bill ranks lotteries according to their expected value. The expected value of lottery *B* is 120. Thus he is indifferent between *A* and *B* if and only if the expected value of *A* is 120, that is, if and only if $60p + 140(1-p) = 120$; thus $p = \frac{1}{4}$.

(b) Bill prefers *B* to *C* if and only if the expected value of *C* is less than 120: $\frac{2}{5}60 + \frac{2}{5}100 + \frac{1}{5}x < 120$, that is, if and only if $x < 280$.

(c) He will choose \$122 for sure, since the expected value of *B* is 120.

(d) Amy prefers lottery *B* to \$121 and prefers \$121 to \$120. Thus, by transitivity, she prefers lottery *B* to \$120, which is the expected value of *B*. Hence she is risk loving relative to lottery *B*.

4. **(a)** *R* is complete. **(b)** *R* is transitive **(c)**

a	*b*	*c*	*d*	*e*
2	2	1	4	3