49600+'1-q ECN 106 : Decision Making Professor Giacomo Bonanno

WINTER 2024 - FIRST MIDTERM EXAM: ANSWERS for VERSION 1

1. **(a)** Being risk neutral, Bill ranks lotteries according to their expected value. The expected value of lottery *A* is 96. Thus he is indifferent between *A* and *B* if and only if the expected value of *B* is 96, that is, if and only if $40p + 120(1-p) = 96$; thus $p = \frac{3}{10}$.

(b) Bill prefers *A* to *C* if and only if the expected value of *C* is less than 96: $\frac{1}{4}60 + \frac{1}{4}80 + \frac{2}{4}x < 96$, that is, if and only if $x < 122$.

(c) Lottery *A* since its expected value is greater than 95.

(d) She prefers \$96 to \$95 and \$95 to *A*. Thus, by transitivity, she prefers \$96 (the expected value of *A*) to *A*. Hence she is risk averse relative to lottery *A*.

2. **(a)** **(a.1)** (*a*,*b*): *b* weakly dominates *a*.

(*a*,*c*): it is neither the case that *a* dominates *c* (because $z_{12} \succ z_4$ and thus *c* is better than *a* in state s_4) nor the case that *c* dominates *a* (because $z_2 \succ z_{10}$ and thus *a* is better than *c* in state s_2).

(*b*,*c*): it is neither the case that *b* dominates *c* (because $z_{12} \succ z_8$ and thus *c* is better than *b* in state s_4) nor the case that *c* dominates *b* (because $z_7 \succ z_{11}$ and thus *b* is better than *c* in state s_3).

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

(b) **(b.1)** (*a*,*b*): it is neither the case that *a* dominates *b* (because $z_5 \succ z_1$ and thus *b* is better than *a* in state s_1) nor the case that *b* dominates *a* (because $z_2 \succ z_6$ and thus *a* is better than *b* in state s_2).

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

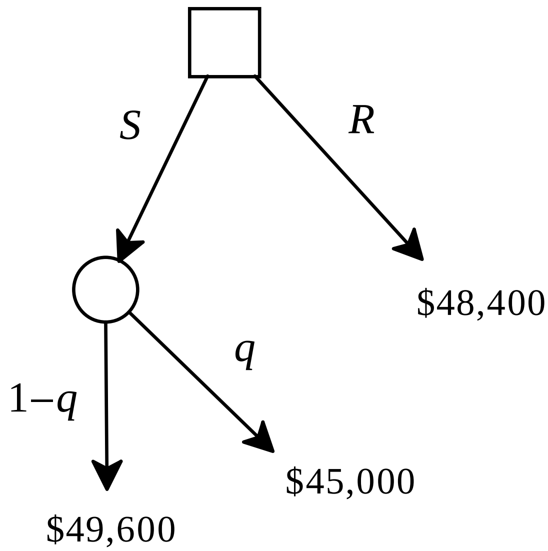
(*b*,*c*): it is neither the case that *b* dominates *c* (because $z_9 \succ z_5$ and thus *c* is better than *b* in state s_1) nor the case that *c* dominates *b* (because $z_8 \succ z_{12}$ and thus *b* is better than *c* in state s_4).

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

(c) **(c.1)** *a* strictly dominates *b* and *c*, *b* strictly dominates *c*.

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

3. The expected value of the lottery $\begin{pmatrix} 25,000 & 64,000 \\ \frac{2}{5} & \frac{3}{5} \end{pmatrix}$ is 48,400; the expected value of the lottery $\begin{pmatrix} 9,000 & 81,000 \\ \frac{1}{2} & \frac{1}{2} \end{pmatrix}$ is 45,000 and the expected value of the lottery $\begin{pmatrix} 16,000 & 100,000 \\ \frac{3}{5} & \frac{2}{5} \end{pmatrix}$ is 49,600. Thus the decision tree can be reduced as follows:



The expected value of the lottery $\begin{pmatrix} 45,000 & 49,600 \\ \frac{1}{3} & \frac{2}{3} \end{pmatrix}$ is 48,066.67. Thus the decision maker will choose *R*. The full backward-induction solution is (*R*, *A*, *A*).

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

a	*b*	*c*	*d*	*e*
0	2	3	1	2