University of California, Davis -- Department of Economics

ECON 106 : DECISION MAKING Professor Giacomo Bonanno

WINTER 2024 - FIRST MIDTERM EXAM **Version 1**

Answer all questions. **If you don't explain (= show your work for) your answers you will get no credit.**

NAME:________________________________ University ID:__________________

CIRCLE THE NAME OF YOUR TA: Kalyani Chaudhuri or **Joaquin Paleo**

If you don't know the name of your TA, then circle your Section:

A01, Tuesday 5-6 **A02, Tuesday 6-7** **A03, Tuesday 7-8** **A04, Tuesday 8-9**

- **By writing your name on this exam you certify that you have not violated the University's Code of Academic Contact** (for example, you have not copied from the work of another student and you have not knowingly facilitated cheating by another student).
- **If you submit the exam without writing your name and ID, you will get a score of 0 for this exam.**
- **If you do not stop writing when told so (at the end), a penalty of 10 points will be deducted from your score.**

1. [20 points] Bill prefers more money to less and is risk neutral. He faces the following money lotteries:

$$A=\begin{pmatrix} \$20 & \$140 & \$160 \\ \frac{2}{5} & \frac{2}{5} & \frac{1}{5} \end{pmatrix}, \quad B=\begin{pmatrix} \$40 & \$120 \\ p & 1-p \end{pmatrix} \quad \text{and} \quad C=\begin{pmatrix} \$60 & \$80 & \$x \\ \frac{1}{4} & \frac{1}{4} & \frac{2}{4} \end{pmatrix}$$

(a) [6 points] He says that he is indifferent between A and B. What can you infer about the value of p?

(b) [6 points] Bill says that he prefers A to C. What can you infer about the value of x?

(c) [3 points] If given a choice between lottery A and \$95 for sure, what will Bill choose?

(d) [5 points] Amy also prefers more money to less and her preferences are transitive. She says that if she had a choice between \$95 for sure and lottery A, she would prefer \$95 for sure. What is her attitude to risk relative to lottery A? Explain your answer.

2. [42 points] Consider the following decision problem:

states →	s_1	s_2	s_3	s_4
acts ↓				
a	z_1	z_2	z_3	z_4
b	z_5	z_6	z_7	z_8
c	z_9	z_{10}	z_{11}	z_{12}

(a) Suppose that the agent's ranking is:

$$z_7 \succ z_2 \sim z_6 \sim z_{12} \succ z_5 \sim z_8 \succ z_1 \sim z_{10} \sim z_{11} \succ z_3 \succ z_4 \sim z_9 .$$

(a.1) [12 points] For each pair of actions state whether one action dominates the other. If your claim is that there is no dominance, then explain why and if your claim is that there is dominance then state whether it is strict or weak dominance (with the understanding that if you say "weak" then you mean "weak and not strict"). [More space on the next page]

	s_1	s_2	s_3	s_4
a	z_1	z_2	z_3	z_4
b	z_5	z_6	z_7	z_8
c	z_9	z_{10}	z_{11}	z_{12}

(a.2) [4 points] Find the Maximin solution.

(b) Suppose now that the agent's ranking is:

$$z_9 \succ z_2 \sim z_4 \sim z_8 \succ z_5 \sim z_6 \succ z_1 \sim z_3 \sim z_{12} \succ z_{10} \succ z_7 \sim z_{11}$$

(b.1) [12 points] For each pair of actions state whether one action dominates the other. If your claim is that there is no dominance, then explain why and if your claim is that there is dominance then state whether it is strict or weak dominance (with the understanding that if you say "weak" then you mean "weak and not strict").

(b.2) [4 points] Find the Maximin solution.

	s_1	s_2	s_3	s_4
a	z_1	z_2	z_3	z_4
b	z_5	z_6	z_7	z_8
c	z_9	z_{10}	z_{11}	z_{12}

(c) Suppose now that the agent's ranking is

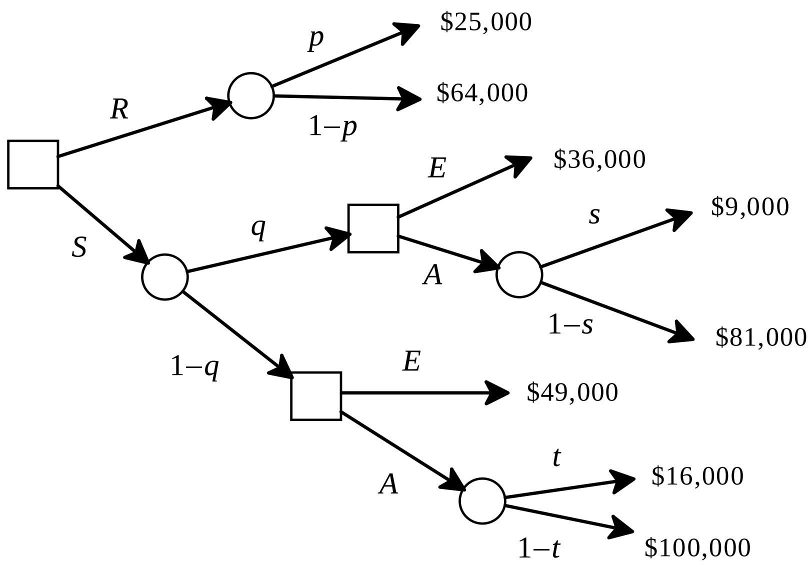
$$z_1 \succ z_2 \succ z_3 \succ z_4 \succ z_5 \succ z_6 \succ z_7 \succ z_8 \succ z_9 \succ z_{10} \succ z_{11} \succ z_{12}$$

(c.1) [8 points] For each pair of actions state whether one action dominates the other. If your claim is that there is no dominance, then explain why and if your claim is that there is dominance then state whether it is strict or weak dominance (with the understanding that if you say "weak" then you mean "weak and not strict").

(c.2) [2 points] Find the Maximin solution.

3. [24 points] Find the backward-induction solution of the decision tree on the following page for a decision-maker who is risk neutral.

Assume that $\boxed{p = \frac{2}{5},\ s = \frac{1}{2},\ t = \frac{3}{5},\ q = \frac{1}{3}}$



4. [14 points] Consider the following preference relation R over the set $\{a,b,c,d,e\}$ (as usual, the interpretation of $(x,y) \in R$ is that x is considered to be at least as good as y; to simplify we omit the reflexive pairs of the form (x,x) which should be taken to be included in R):

$$R = \{(b,a), (b,d), (b,e), (c,a), (c,b), (c,d), (c,e), (d,a), (e,a), (e,b), (e,d)\}$$

(a) [2 points] Check one of the two boxes: ☐ R is complete, ☐ R is not complete.

(b) [2 points] Check one of the two boxes: ☐ R is transitive, ☐ R is not transitive.

(c) [10 points] Represent R by means of a utility function that takes on integer values which are consecutive and start at 0.