

WINTER 2024 - SECOND MIDTERM EXAM Version 2

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

NAME: _____ **University ID:** _____

- **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.** [27 points] Consider the following money lotteries: $A = \begin{pmatrix} \$30 & \$32 & \$40 & \$44 & \$48 \\ \frac{2}{48} & r & s & \frac{4}{48} & \frac{14}{48} \end{pmatrix}$,
- $B = \begin{pmatrix} \$30 & \$36 & \$44 & \$48 \\ \frac{1}{24} & 2p & \frac{1}{12} & p \end{pmatrix}$. Find the value of one unknown and write two equations in the other two unknowns whose solution guarantees that A is a mean-preserving spread of B . [No need to solve the equations. In order to get credit you need to show your work.]

2. [53 points] Consider the following money lotteries: $A = \begin{pmatrix} \$36 & \$81 \\ \frac{2}{3} & \frac{1}{3} \end{pmatrix}$, $B = \begin{pmatrix} \$16 & \$121 \\ \frac{3}{5} & \frac{2}{5} \end{pmatrix}$.

(a) [4 points] How does a risk-neutral person rank A and B ?

(b) [4 points] Suppose that Amy's utility-of-money function is $U(m) = \sqrt{m}$. If offered a choice between \$51 for sure or lottery A , what would she choose?

(c) [8 points] Suppose that Amy's utility-of-money function is $U(m) = \sqrt{m}$. How does she rank A and B ?

Now consider binary lotteries of the form $\begin{pmatrix} \$y & \$z \\ \frac{1}{2} & \frac{1}{2} \end{pmatrix}$ with $y \geq 0$, $z \geq 0$. In your diagrams **measure y on the horizontal axis and z on the vertical axis.**

(d) [8 points] In the (y, z) plane draw the indifference curve that goes through point $C = (81, 25)$ for an individual who is risk neutral. Clearly show where point $D = (36, 64)$ lies relative to this indifference curve. **Write your answer on the next page.**

$$C = (81, 25), D = (36, 64)$$

(e)[8 points] In the (y, z) plane draw the indifference curve that goes through point $C = (81, 25)$ for Amy (whose utility function is $U(m) = \sqrt{m}$). Clearly show where point $D = (36, 64)$ lies relative to this indifference curve.

(f) [5 points] For a risk-neutral person calculate the slope, at point $C = (81, 25)$, of the indifference curve that goes through point C .

(g) [8 points] For Amy (whose utility function is $U(m) = \sqrt{m}$) calculate the slope, at point $C = (81, 25)$, of the indifference curve that goes through point C and the slope, at point $D = (36, 64)$, of the indifference curve that goes through point D .

(h) [8 points] Calculate, at point $F = (49, 49)$, the slope of the indifference curve that goes through point F for a risk-neutral person and for Amy (whose utility function is $U(m) = \sqrt{m}$).

3. [20 points] Consider the following money lotteries:

$$A = \begin{pmatrix} \$15 & \$20 & \$35 & \$45 \\ \frac{1}{5} & \frac{3}{5} & \frac{1}{10} & \frac{1}{10} \end{pmatrix} \text{ and } B = \begin{pmatrix} \$15 & \$16 & \$20 & \$28 & \$35 & \$45 \\ \frac{1}{5} & x & \frac{1}{10} & y & \frac{1}{10} & \frac{1}{10} \end{pmatrix}$$

Find all the values of x and y that are such that *every* person who (1) has von Neumann-Morgenstern preferences and (2) prefers more money to less, strictly prefers A to B . [In order to get credit you need to show your work.]