Homework 7 – Utility Theory

Due: 1:30pm, May 14, 2025

1. Winston (2004), Section 2.2, Prob. 8

    We are going to invest \$1,000 for a period of 6 months. Two potential investments are available: T-bills and gold. If the \$1,000 is invested in T-bills, we are certain to end the 6-month period with \$1,296. If we invest in gold, there is a 3/4 chance that we will end the 6-month period with \$400 and a 1/4 chance that we will end the 6-month period with \$10,000. If we end up with x dollar, our utility function is given by $u = x^{1/2}$. Should we invest in gold or T-bills?

2. Winston (2004), Section 2.2, Prob. 12

    (The St. Petersburg Paradox) Let L represent the following lottery: I toss a coin until it comes up heads. If the first head is obtained on the nth toss of the coin, I receive a payoff of $\$2^{n}$.

    a) If I were a risk-neutral decision maker, what would be the certainty equivalent of L? Is this reasonable?

    b) If a decision maker's utility function for increasing wealth by x dollars is given by $u(x) = \log_2(x)$, what would be the certainty equivalent of L?

Submission requirements:

1. For each (sub)problem, name the solution file as "*problem_x.ext*," where "*x*" represents the (sub)problem number (x = 1, 2, 3 or x = 1a, 1b, 1c) and the file extension "*ext*" depends on the file type (Word, Excel, PDF, etc.). If the solution to a (sub)problem contains multiple files (e.g., a Python package), organize the file(s) into a folder and name the folder as "*problem_x*."

2. Note that your Python files must be able to be executed directly. So use relative paths instead of absolute paths. If necessary, you may provide a short "user manual" of instructions on how to execute your codes.

    Warning: If the TAs have to manipulate your Python package to verify your solutions, you will be deducted points from your grade.

3. Pack all the "(sub)problem" folders in a zip file and name the zipped file "*hw_##_Chinese name.zip*," where "*##*" (two digits) represents the homework number, for example, "*hw_07_赵磊.zip*."