EconS 301- Intermediate Microeconomic Theory
Quiz #2 - February 26th, 2026.

1. Suppose that you took part in a lottery that had a chance to increase, decrease, or have no effect on your level of income. With probability 0.4, your income remains at its original level, $1000. With probability 0.15, your income increases to $1700, and with probability 0.45, your income decreases to $500. Your utility function is

$$u(I) = 3I^{\frac{2}{3}},$$

where I denotes your income level.

(a) Using only the utility function, show that your risk preferences are risk averse.

- We know that utility functions following the form $u(I) = a + bI^{\gamma}$ are concave where a and b are positive, and $\gamma \in (0,1)$. For our utility function, $a = 0$, $b = 3$, and $\gamma = \frac{2}{3} \cong 0.67$. This fits the requirements for a concave utility function, which means that we are risk averse.

(b) Calculate both your EU and the utility equivalent of the EV of your income.

- *Expected utility.* The expected utility of our income is

$$EU = 0.4(3 \times 1000^{\frac{2}{3}}) + 0.15(3 \times 1700^{\frac{2}{3}}) + 0.45(3 \times 500^{\frac{2}{3}})$$
$$= 0.4(300) + 0.15(427.32) + 0.45(200.97)$$
$$= 274.53.$$

- *Utility of expected value.* First, we need to find our expected income; that is,

$$EV = (0.4 \times \$1000) + (0.15 \times \$1700) + (0.45 \times \$500)$$
$$= \$400 + \$255 + \$225$$
$$= \$880.$$

Our utility at the expected value is

$$u(880) = 3 \times 880^{\frac{2}{3}} = 275.49.$$

(c) Using the results from part (b), show that your risk preferences are risk averse.

- To show that we are risk averse, we need that $u(EV) > EU$, which holds in this case since

$$275.49 = u(EV) > EU = 274.53.$$

(d) Suppose now that you had the option to either accept this lottery, or walk away with your initial $1000. Should you accept the lottery? Why or why not?

- With our initial income, our utility is

$$u(1000) = 3 \times 1000^{\frac{2}{3}} = 300.$$

Since this is more than our expected utility from accepting the lottery ($EU = 274.53$), we should not accept the lottery.

(e) Calculate your certainty equivalent.

- The certainty equivalent is found by solving

$$u(CE) = EU,$$

where $EU = 274.53$ as found in part b, and $u(I) = 3I^{\frac{2}{3}}$. The previous equation becomes

$$
\begin{aligned}
3 \times CE^{\frac{2}{3}} &= 274.53 \\
CE^{\frac{2}{3}} &= 91.51
\end{aligned}
$$

Taking each side to the 3/2 power, we find the certainty equivalent

$$CE = 91.51^{\frac{3}{2}} = 875.39.$$

(f) Calculate and interpret your risk premium. Is it consistent with risk aversion?

- The risk premium RP is found by solving the following

$$CE = EV - RP.$$

Plugging in $EV = 880$ and $CE = 875.39$, we obtain

$$875.39 = 880 - RP,$$

and solving for RP gives us our risk premium

$$RP = \$4.61.$$

Therefore, we would need to decrease the expected value of the lottery by $4.61 to feel indifferent on accepting the lottery and taking the certain payout of the expected value. Since this value is positive, and we need to receive money to prefer the lottery, we again confirm that we are risk averse.