HW - Risk Utility Curve

Start Assignment

- Due Nov 24 by 11:59pm
- Points 15
- Submitting a file upload

Objective: Apply Python programming to analyze and graphically represent the risk utility preferences for a given company based on a defined utility function.

Scenario: Assume the utility function for a company is defined as:

$U(M) = e^{(M/50)} - 1$

The company must evaluate two financial options:

Option A: Guaranteed to make $M

Option B: M % chance you get $100 and (100 - M)% chance you make $0.

Tasks:

1. **(3 pts)** Derive and clearly state the utility equations for Option A and Option B as functions of M.
2. **(5 pts)** Write a Python script to calculate and plot the utility values for both Option A and Option B on the same graph. Plot values for M ranging from 0 to 100 in increments of 10. Clearly label your graph (axes, title, legend).
3. **(2 pts)** Analyze your graph and determine if the company is risk-averse, risk-seeking, or risk-neutral. Explain your reasoning clearly in comments within your Python script.
4. **(2 pts)** Using your Python script, calculate utility values UA and UB for M = $40. Which option should the company select and why? Clearly document your results and reasoning within the Python script.
5. **(2 pts)** Using your Python script, calculate utility values UA and UB for M = $70. Which option should the company select and why? Clearly document your results and reasoning within the Python script.
6. **(3 pts)** Determine using Python programming: For this company, a guaranteed payment of $70 has the same utility as the gamble (Option B) at what exact dollar amount? Use your script to find this dollar amount precisely and document your approach clearly.

Submission Requirements:

Submit a ZIP folder comprising:

- Your complete Python script (.py file) containing clearly commented code and written explanations.
- Screenshot of your plotted graph clearly showing all elements (legend, axes labels, and title).

- Screenshot of the terminal output clearly showing your answers and calculations for Tasks 4, 5, and 6.

Note: No hard coding or manual calculations outside of Python code will be accepted for credit.

HW 12 - Risk Utility

Criteria	Ratings		Pts
Question 1 Determine the utility equations for options A and B as functions of M clearly using Python.	**3 pts** **Full Marks** Equations accurately derived and coded in Python.	**0 pts** **No Marks** No attempt or significantly incorrect.	3 pts
Question 2 Using excel graph, the results of part 1 for M = 0 to 100 in steps of 10.	**3 pts** **Full Marks** Graph correctly generated, clearly labeled, accurate curves.	**0 pts** **No Marks** No attempt or significantly incorrect.	3 pts
Question 3 Correctly identify and justify whether the company is risk-averse, risk-neutral, or risk-seeking.	**2 pts** **Full Marks** Correct identification and logical justification.	**0 pts** **No Marks** No attempt or incorrect identification.	2 pts
Question 4 For M=$40, calculate UA and UB using Python, and explain clearly the preferred option.	**2 pts** **Full Marks** Correct calculations, correct preference explained clearly.	**0 pts** **No Marks** No attempt or incorrect results.	2 pts
Question 5 For M=$70, calculate UA and UB using Python, and explain clearly the preferred option.	**2 pts** **Full Marks** Correct calculations, correct preference explained clearly.	**0 pts** **No Marks** No attempt or incorrect results.	2 pts
Question 6 Clearly determine (using Python) the value of M at which a guaranteed $70 has the same utility as the gamble in Option B.	**3 pts** **Full Marks** Correct Python implementation and correct solution clearly presented.	**0 pts** **No Marks** No attempt or incorrect solution.	3 pts
			Total Points: 15