1. **Demand for insurance and risk aversion**

   a) Consider two individuals with utility functions $u(y) = ln(y)$ and $v(y) = y^{\alpha}$. Are $u(y)$ and $v(y)$ possible utility functions for risk averse individuals? Calculate for both individuals the Pratt-Arrow coefficients of absolute risk aversion.

   b) Both individuals have an initial endowment W and suffer a loss L with probability π. They can now buy insurance cover C for a premium rate p. Calculate for both individuals their optimal demand for insurance C^*.

   c) Show for $u(y) = ln(y)$, and give an intuitive explanation, under what conditions the optimal demand for insurance can be negative.

   d) The insurance company demands in addition to the actuarially fair premium rate $p = \pi$ a constant payment k in order to cover fixed costs. Using a diagram, show that if k is small, full insurance is still the optimal choice for the individual. What is the maximum k_{max} such that the individual still buys insurance? Is k_{max} the same for both individuals (argue without calculating the respective k_{max})?

2. **Demand for insurance and certainty equivalent income** A risk averse individual with initial endowment W suffers a loss L with probability π. She can buy insurance cover from a risk neutral insurance company, that makes zero profits, for a premium rate p. Show in a two-states-of-the-world graph the individual's certainty equivalent income and risk premium, the optimal premium pC^* and cover C^*, and draw the insurance company's zero profit line and its slope.

3. **Stochastic dominance**

   a) An individual with initial endowment W suffers loss L with probability π. Now, L is equally distributed over the interval $L \in [L_{min}, L_{max}]$. The only available insurance policy requires a premium $P = \pi \cdot B$ and pays an amount B in the event of any loss, with B being the expected value of the loss, given there is a loss. Will the individual buy this insurance contract?
   (Hint: Compare the two lotteries with respect to their riskiness and recall what you know about SOSD (Second Order Stochastic Dominance). Be aware that the individual has the same expected wealth with and without buying the insurance contract.)

   b) Consider a numerical example: $W = 10$, L is uniformly distributed on the intervall $\in [6; 10]$, $\pi = \frac{1}{2}$ and $P = \pi \cdot B$. Calculate B and P. Analyze the situation with and without insurance graphically. Can you find SOSD?

   c) The loss is now equally distributed on the interval $L \in [0, W]$. What does this mean for the individual's income? What is the certainty equivalent income, if the individual has the utility function $u(y) = y^{\alpha}$ with $\alpha \in (0; 1)$? What happens if $\alpha \to 1$?