1. Ann’s initial wealth is $10,201 and she faces a potential loss in the amount of $5,301 with probability $\frac{1}{7}$. Her von Neumann-Morgenstern utility-of-money function is $U(m) = \sqrt{m}$. An insurance company is willing to insure her and offers the following menu of contracts: Ann can choose any deductible $0 \leq d \leq 5,301$ and the corresponding premium is $h = 1,060.2 - \frac{d}{5}$.

(a) Calculate Ann’s expected utility if she does not insure.
(b) Calculate Ann’s expected utility if she chooses full insurance.
(c) Find the equation in the wealth space $(W_1, W_2)$ corresponding to the equation $h = 1,060.2 - \frac{d}{5}$, that is, find the equation of the insurance budget line.
(d) Does the insurance budget line go through the no-insurance point?
(e) Calculate the slope of the reservation indifference curve at the no-insurance point.
(f) Comparing the slope of the reservation indifference curve at the no-insurance point and the slope of the insurance budget line, what can you conclude about Ann’s choice of insurance contract?

2. The owner of a firm wants to hire a manager to run the firm. There are two possible outcomes, measured by the profits of the firm: $\pi_1 = $800 and $\pi_2 = $500. The probability of $\pi_1$ is 25%.

There is no issue of moral hazard.

(a) For this part assume that the owner is risk-averse and the manager is risk-neutral. In an Edgeworth box show the set of Pareto efficient contracts.
(b) For this part assume that the owner is risk-neutral and the manager is risk-averse.
(b.1) In an Edgeworth box show the set of Pareto efficient contracts.
(b.2) Sketch the indifference curves of owner and manager through the point $(w_1 = 200, w_2 = 0)$, where $w_1$ is the payment to the manager if the profit is $\pi_1$ and $w_2$ is the payment to the manager if the profit is $\pi_2$.
(b.3) Calculate the slope of the owner’s indifference curve at $(w_1 = 200, w_2 = 0)$ and at $(w_1 = 500, w_2 = 250)$.

From now on assume that the owner’s utility-of-money function is $U(m) = \sqrt{m}$ and the manager’s utility function is $W(m) = 90 - \left(12 - \frac{m}{100}\right)^2$.

(c) Consider the following contract: “the manager will get one quarter of the profits of the firm”. Is this contract Pareto efficient? Explain your answer.
(d) (d.1) In an Edgeworth box sketch the indifference curves of owner and manager through contract $A = (w_1 = 450, w_2 = 200)$.
(d.2) If you were asked to find a contract that is Pareto superior to contract $A$, what changes would you make to contract $A$? Explain your answer.
(e) Suppose that owner and manager have agreed that the manager should get half of the firm’s profits if the profits are $500. What equation would you have to solve in order to complete the contract in such a way that the contract is Pareto efficient?