Explain why diminishing marginal utility implies that a decision maker will be risk averse.

A utility function that exhibits diminishing marginal utility will imply the decision maker is risk averse. This is because with a utility function with diminishing marginal utility a decision maker will prefer a sure thing to a lottery with the same expected value. By preferring the sure thing, the decision maker prefers less risk, implying the decision maker is risk averse.

Consider a lottery with three possible outcomes: a payoff of -10, a payoff of 0, and a payoff of 20. The probability of each outcome is 0.2, 0.5, and 0.3, respectively.

a) Sketch the probability distribution of this lottery.

b) Compute the expected value of the lottery.

c) Compute the variance and the standard deviation of the lottery.

Consider two lotteries, A and B. With lottery A, there is a 0.90 chance that you receive a payoff of $ 0 and a 0.10 chance that you receive a payoff of $ 400. With lottery B, there is a 0.50 chance that you receive a payoff of $ 30 and a 0.50 chance that you receive a payoff of $ 50.

(a) Verify that these two lotteries have the same expected value but that lottery A has a bigger variance than lottery B.

(b) Suppose that your utility function is $U = \sqrt{I + 500}$. Compute the expected utility of each lottery. Which lottery has the higher expected utility? Why?

(c) Suppose that your utility function is $U = I + 500$. Compute the expected utility of each lottery. If you have this utility function, are you risk averse, risk neutral, or risk loving?

(d) Suppose that your utility function is $U = (I + 500)^2$. Compute the expected utility of each lottery. If you have this utility function, are you risk averse, risk neutral, or risk loving?

Suppose that your utility function is $U = \sqrt{I}$. Compute the certainty equivalent and risk premium of the two lotteries described in the previous problem.

Consider a household that possesses 100,000$ worth of valuables (computers, stereo equipment, jewelry, and so forth). This household faces a 0.10 probability of a burglary. If a burglary were to occur, the household would have to spend 20,000$ to replace the stolen items. Suppose it can buy an insurance policy for 500$ that would fully reimburse it for the amount of the loss.

(a) Should the household buy this insurance policy?

(b) Should it buy the insurance policy if it cost 1,500$? 3,000$?

Suppose a consumer has to choose between a safe investment and a risky investment; his utility function is $U(R) = \sqrt{R}$. The return associated to the safe investment is 400 €; the risky investment gives a return of 100 € with probability 0.3 and a return of 900 € with probability 0.7.

(a) State whether the consumer is risk averse/loving/neutral and find the optimal investment choice.

(b) For which values of safe return the consumer is going to choose the safe investment?

(c) Draw on a graph the utility function and clearly mark the solutions found in parts a and b.