Econ 30010

Intermediate Microeconomic Theory

Answers to Chapter 15 Problems

4. $Eu = .2\sqrt{9} + .2\sqrt{16} + .2\sqrt{25} + .2\sqrt{36} + .2\sqrt{49} = 5$

5.b. EV = .75·0+.25·200 = 50

c. $Eu = .75\sqrt{50 \cdot 0} + .25\sqrt{50 \cdot 200} = 25$

d. $u(50) = \sqrt{50 \cdot 50} = 50$. You are risk averse because the expected utility of the lottery is less than the utility you receive from getting the expected value with certainty.

6. a. Contract 1: Expected salary = $40000

Contract 2: Expected salary = .5·$20000+.5·$60000 = $40000

b. Contract 1: $Eu = 2 \cdot 40000 + 10\sqrt{40000} = 82000$

Contract 2:

$Eu = .5(2 \cdot 20000 + 10\sqrt{20000}) + .5(2 \cdot 60000 + 10\sqrt{60000}) = .5 \cdot 41414 + .5 \cdot 122449 = 81932$

c. Since the risky contract has the same expected value as the riskless contract but a smaller expected utility, you are risk averse.

13. First, we need to calculate the expected value of the investment. It equals .5·$100000+.5·$20000 or $60000. Second, we need to calculate the expected utility of the investment. It equals $.5 \cdot 10 \cdot \ln(100000) + .5 \cdot 10 \cdot \ln(20000) = 107$.

Third, we need to calculate the certainty equivalent for this investment. It is the payoff that gives you a guaranteed utility equal to 107. That is, the certainty equivalent solves the equation $10 \cdot \ln(I) = 107$ or I = $44356.

Fourth, the risk premium is the difference between the expected value of the investment and your certainty equivalent. Thus, the risk premium for this investment equals $15644.

14.a. The household's expected value of its valuables without insurance equals .9·$100000+.1·$80000 = $98000 and the expected value of its valuables with insurance is $99500. Since the expected value with insurance is greater than the expected value without insurance, the household's expected utility with insurance will be greater than the household's expected utility without insurance as long as the household is not risk-seeking. Thus, the household will prefer to buy the insurance.

b. The household will continue to buy insurance at a premium of $1500 because the household receives a larger expected value and faces no risk with the insurance than without it. At a premium of $3000, there is insufficient information to determine which option is preferred by the household. Now buying insurance implies results in a lower expected value than not having insurance but also eliminates the household's risk. Whether $3000 is too high of a premium to warrant buying the insurance can only be determined by knowing the household's utility function.

c. With the utility function, $U = \sqrt{3I}$ where I is measured in terms of the value of the household's valuables, not having insurance implies an expected utility equal to 542 and a certainty equivalent equal to $97900. Thus, the household's risk premium equals $2100. This is the most the household would pay for this insurance.

18. a. A person's expected income (expected value) without insurance equals $40000q + 90000(1-q)$ or $90000 - 50000q$ and a person's expected utility without insurance equals

$$q\sqrt{40000} + (1-q)\sqrt{90000} = 200q + 300(1-q) = 300 - 100q\ .$$

That person's utility with insurance equals $\sqrt{90000 - 5900} = 290$. Thus, this person will buy insurance as long as $290 \geq 300 - 100q$ or as long as $q \geq .1$.

b. If the premium increases to $27500, the guaranteed utility with insurance now equals $\sqrt{90000 - 27500} = 250$ which means a person will buy insurance as long as $250 \geq 300 - 100q$ or if $q \geq .5$. Thus fewer people will buy insurance.