

Problem set 2

due Thursday, September 30th by 3:30pm

1. Suppose an investor is concerned about a business choice in which there are three prospects— the probabilities and returns are given below:

Probability	Return
0.4	\$100
0.3	\$30
0.3	-\$30

What is the expected value of the uncertain investment? What is the variance? What is the standard deviation?

2. Initially, good X costs \$120 and good Y costs \$80. If the price of X increases by \$18 and the price of Y increases by \$12, describe what the new budget line will look like relative to the original budget line.
3. A consumer's utility function over apple juice A and orange juice O is $u(A, O) = 15A + 60O$.
- a. how many units of apple juice is the consumer willing to accept in place of one unit of orange juice?
 - b. If $p_A = \$.25$ and $p_O = \$.50$, and the consumer has \$30 to spend on juice, what is the optimal bundle?
 - c. Draw a graph containing the budget line and utility-maximizing indifference curve.
4. For each scoop of ice cream (I) that you eat, you need 2 cherries (C) and 10 scoops of fudge (F). You are not interested in ice cream unless served with these toppings.
- a. Write a utility function over I , C , and F that represents your preferences (hint: these goods are perfect complements for you. Look at the example we did in class with 2 goods, and try to extend it to three goods. For example, if you have only 2 cherries and 10 fudge scoops, having more than 1 scoop of ice cream is worthless to you.)
 - b. Suppose you have $\$I$ to spend on ice cream sundaes. If each scoop of ice cream costs \$1, each cherry costs \$.50, and each scoop of fudge costs \$.10, determine the utility-maximizing bundle for any value of I (hint: the only math you need to do this is very simple.)
5. Braylon needs to drive from Lexington to Indianapolis, and has two choices. On 75/74, he faces probability $\frac{1}{2}$ of a \$200 speeding fine. On 64/65, he faces probability $\frac{1}{4}$ of a \$300 fine. Braylon's wealth is \$300 before his trip, and his utility function is $u(w) = \sqrt{w}$.
- a. Is Braylon's expected wealth higher by driving on 75/74 or on 64/65?
 - b. Is Braylon's expected utility higher by driving on 75/74 or on 64/65?
 - c. Which route will Braylon choose?

6. Alice and Bob are neighbors. Each owns a car values at \$10,000. Alice's wealth, including the value of her car, is \$80,000. Bob's wealth, including the value of his car, is \$20,000. Each has utility function $u(w) = w^4$, where w denotes total wealth. If a car is parked on the street, there is a probability .5 that the car will be stolen. If a car is parked in a garage, it will not be stolen.

- a. What is the largest amount Alice would be willing to pay for the garage?
- b. What is the largest amount Bob would be willing to pay for the garage?

7. Lisa just inherited a vineyard from a distant relative. In good years (no rain or frost), she earns \$10,000 from the vineyard. In bad years, she earns only \$2,500. She estimates that the probability of a good year is 60%.

- a. Calculate the expected value and variance of Lisa's income from the vineyard.
- b. Suppose Lisa has utility function $u(w) = \sqrt{w}$, where w is her wealth. Assume she has 0 initial wealth. Ethan, a grape buyer, offers to lease the vineyard from Lisa for \$6,500 next year, so that Lisa would get \$6,500 regardless of whether it was a good year or a bad year. Will Lisa accept this offer?
- c. Why might the vineyard be worth more to Ethan than to Lisa (i.e. why would he make such an offer)? Give three reasons, and explain each. One of these reasons should refer to his attitude toward risk.