

Problem Set #2

1. John's utility function is $U(c) = \ln(c)$. He purchases a risky asset that pays \$404 with probability 0.6 and \$1097 with probability 0.4. What is the risk premium associated with this asset?
2. Robinson Crusoe and Chuck Noland consume coconuts and volleyballs. Robinson has an initial endowment of 6 coconuts and 3 volleyballs. Chuck has an endowment of 8 coconuts and 1 volleyball. Robinson's utility function is $U_r(c, v) = \ln(c_r) + \ln(v_r)$. Chuck's utility function is $U_h(c, v) = \ln(c_h) + 2 \ln(v_h)$.
 - a. Draw an Edgeworth box with Robinson's consumption measured from the lower left and Chuck's consumption measured from the upper right. Place coconuts on the x-axis and volleyballs on the y-axis. Label the endowment point.
 - b. Use Robinson and Chuck's utility functions to express the condition that maps out the contract curve in terms of c_r, c_h, v_r and v_h . (Hint: marginal utilities)
 - c. Now, use your knowledge about the endowments to express the contract curve only as a function of c_r and v_r .
3. Write down the conditions that define a competitive equilibrium between Robinson and Chuck. There should be five or six conditions depending on how you set them up.
 - a. Use the conditions characterizing Robinson's marginal utility and his budget constraint to solve for v_r as a function of p_c, p_v .
 - b. Use the conditions characterizing Chuck's marginal utility and his budget constraint to solve for v_h as a function of p_c, p_v .
4. Using the same framework from Question 3,
 - a. Let p_v be the numeraire good (set $p_v = 1$). Use your answers from (a) and (b) along with the last two conditions to solve for p_c .
 - b. Use p_c to solve for c_r, c_h, v_r and v_h .
5. Linus' utility function is $U_L(a_L, b_L) = a_L + b_L$ while Lucy's utility function is $U_C(a_C, b_C) = a_C b_C$. Linus has an initial endowment of 6 units of a and 1 units of b while Lucy has an initial endowment of 3 units of a and 5 units of b .
 - a. Draw the Edgeworth box related to these agents with Linus' consumption plotted from the lower left and good a on the vertical axis. Label the endowment point.
 - b. What type of preferences does each agent have? (Hint: how does Linus trade off between a and b ? Lucy's preferences are named after two famous economists.)
 - c. Derive the marginal rates of substitution for Linus and Lucy. What is peculiar about Linus' MRS? Now, write out the condition describing all Pareto optimal allocations.
 - d. If we allow the price of a to be 1, then in a competitive equilibrium, what must the price of b be?
 - e. At these equilibrium prices, calculate Linus and Lucy's consumption of a and b .