

## First Midterm Exam

Each part of a question (a, b, c, etc.) is worth 5 points. Make sure to allot your time accordingly. Total of 30 points, -1 for messiness, -2 for extreme messiness, +1 possible bonus point.

When you are finished, please keep the exam sheet and hand in your blue book. Thanks.

1. *Jumping*. (This problem from Health Economics class at UC Irvine.) Your utility function is given by  $U(C) = \ln(4C)$ , where  $C$  is consumption. You make \$40,000 per year and enjoy jumping out of perfectly good airplanes.  
There's a 5% chance that, in the next year, you'll break both legs and will incur medical costs of \$15,000.
  - (a) What is your expected income without insurance? What is your expected utility without insurance? Draw a graph of the situation.
  - (b) Suppose you can buy insurance that will cover only 10,000 of the medical expenses. What is the actuarially fair premium for such a policy? (Remember, actuarially fair does not mean the policy provides full insurance; this one does not.) What is your expected utility if you buy this fair policy?

2. *Future.* You have utility function  $u(c_1, c_2) = c_1^{2/10} c_2^{3/10}$  where  $c_1$  is the total amount of consumption today and  $c_2$  is the total amount of consumption in the future. You have current yearly income of  $m_1 = 30$  (think thousand) dollars and expect to have yearly income of  $m_2 = 100$ .

You've already figured out that the proper interest rate to use to discount the future is  $r$ ; this already includes your best estimate of inflation and the nominal interest rate.

- (a) Use either the MRS = slope of budget line method or the Lagrangian to maximize your utility and find your demand function for current consumption,  $c_1(r)$ .
- (b) Draw an indifference curve/budget line diagram showing your  $m_1$ ,  $m_2$ ,  $c_1$ , and  $c_2$  points when the interest rate is  $r = 0.05$ . Are you a borrower or a lender in period 1?
- (c) When you actually get to time period 2, you will have enough wealth to buy consumption bundle  $c_2$ , and assume that bundle consists of two goods,  $x_2$  and  $y_2$ . Suppose that your original plan was that it would be optimal to buy bundle  $(x_2^*, y_2^*)$  at prices  $p_x$  and  $p_y$ . Show this as a tangency on an  $x$  versus  $y$  indifference curve / budget line diagram. If it turns out that the price ratio is different than what you planned for, will you receive more or less utility than you planned? (Illustrate your answer on your diagram.)