1	2	3	4	Total

Economics 142 Midterm Exam **NAME**________________________________

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Your grade from this exam is one third of your course grade. The exam ends promptly at 1:50, so you have 80 minutes. You may not use books or notes. (Calculators are allowed, but shouldn't be needed.) There are four questions, weighted equally. Write your name in the space above now. Write your answers below the questions, on the back of the page, or if you prefer on separate sheets. Write your answers in the spaces provided, explain your arguments, and show your work. Good luck!

1. (10 on problem set 1, omitting part c) An individual chooses among lotteries according to preferences that are complete, transitive, and continuous. He cares only about money, and all the lotteries he faces have the same three possible outcomes, $1, $2, and $3; the probabilities of these outcomes are denoted p_1, p_2, and p_3, respectively. Labeling your diagrams carefully so that I can tell how they were constructed, draw an indifference map in (p_1, p_3)-space for an individual who:

a. is risk-loving, likes money (always prefers first-order stochastically dominating shifts in the distribution of money outcomes, that is, shifts that move probability from lower to higher money outcomes), and satisfies the independence axiom

b. is risk-averse, likes money, but is not an expected-utility maximizer

2. (not on problem set) This problem concerns a Kahneman-Knetsch-Thaler-style experiment in which mugs are randomly distributed to half of the subjects (“owners”) in an experiment and they are then allowed to trade them with other subjects (“non-owners”)for money if they wish. Imagine that each subject has linear consumption utility for mugs: $v_{mug} + m$, where m is the amount of money s/he has left after any mug purchase or sale. (To a person with mug consumption value v_{mug}, having a mug is worth the same as having another \$*v* would be, and not having a mug is worth \$0.) Each subject also has gain-loss utility over deviations from mug and/or money consumption from a reference point determined by her/his expectations. The coefficient of loss aversion is 2, so losses (in mugs and/or money) relative to the reference point lower utility twice as much as gains raise it. The weight of gain-loss utility is η, so total utility is consumption utility + η × gain-loss utility.

a. First consider, as we did in class, an owner with mug consumption value \$*v* who expects to keep her/his mug (and gain no money), so that her/his reference point is having the mug and \$0). What is the lowest price *m* (in dollars) at which s/he would be willing to sell his mug, as a function of *v* and η? Carefully explain your argument.

b. Now consider an owner with mug consumption value \$*v* who expects to sell her/his mug for \$2*v*, so that her/his reference point is having no mug and \$2*v*. For what values of *v* and η will the owner be willing to sell her/his mug for \$2*v*? Explain carefully.

3. (20 on problem set 1, omitting parts (iii) of each part and all of part e). For each of the following anecdotes, briefly explain (i) why the person's behavior is *prima facie* inconsistent with expected utility theory and (ii) why it is consistent with prospect theory.

a. Some students who were about to buy season tickets to a campus theater group were randomly selected and given a discount. During the first part of the season, those who paid full price attended significantly more plays than those who received discounts.

b. Cab drivers in New York City work longer hours on warm, sunny days when their per-hour wage is low.

c. People purchase insurance against damage to their telephone wires at 45 cents a month even though the probability that they'd incur the $60 repair cost in any month is 0.4%.

d. Bettors tend to shift their bets toward longshots, and away from racetrack favorites, later in the racing day.

4. (25 from problem set 1, eliminating the last part of b) Suppose that in the course of a regular check-up, a doctor discovers that the patient has a potentially cancerous lesion. Most lesions are benign (non-cancerous), say 99%. The doctor orders an x-ray just in case. In laboratory tests on malignant (cancerous) lesions, the x-ray returns positive (cancer-affirming) results 79.2% of the time and negative results 20.8% of the time. In laboratory tests on benign lesions, the x-ray returns positive results only 9.6% of the time and negative results 90.4% of the time.

a. The patient's x-ray comes back positive. What is the probability that the patient has cancer? You need not simplify your calculations; if you prefer, just show the calculations before simplification.

b. Suppose that the doctor calculates the probability that the patient has cancer without regard to the base rate of cancer in the population—that is, the doctor uses Bayes' Rule but assumes that cancerous and non-cancerous lesions are equally likely. What mistaken conclusion will the doctor draw from the test? How is this mistake an example of representativeness?