# Decisions and Uncertainty: Midterm Exam 

November 7, 2017

Please, answer the following questions. The total number of points is 60 . Time allowed: two hours. PLEASE PLEASE, make an effort to write in a legible and organized fashion.

1. (40 points) The representation of preferences under certainty.
(a) Describe the "binary relation" approach to representing such preferences. State the axiom or axioms, discuss it/them briefly, and then state and sketch a proof of a representation theorem. Discuss the difference between dealing with a finite or countable consequence set and an uncountable one, in as much detail as you can.
(b) Limiting yourself to the finite $C$ case, discuss the alternative approach of "revealed preferences," its main axiom and the relations between the two approaches. (EXTRA CREDIT: What about the infinite $C$ case?)
2. (20 points) Suppose that a decision maker maximizes (subjective) expected utility and revises her beliefs in the face of evidence according to Bayes's rule. Assume that $C=\mathbf{R}$, i.e., consequences are monetary payoffs, and that her utility function is $u(x)=x$. She has the possibility of gambling on the toss of a coin: She can not participate (for a net result of $\$ 0$ ), or she can say either 'heads' or 'tails' and and she will win $\$ 30$ if the coin falls with her choice upwards and lose $\$ 50$ otherwise. Without additional information, she thinks that it is equally likely that the coin is two-headed, fair, or twotailed (that is, she assigns probability $1 / 3$ to each of these three states of the world). How much will she be willing to pay to observe a single sample toss?
