1 Assignment 2 (Choice Under Uncertainty)

1. Verify the examples E1-E7 in the notes of preferences over lotteries if they satisfy the continuity and the independence axioms of expected utility theory.

2. One way to construct preferences over lotteries with monetary outcomes is by evaluating each lottery F by its expected value E_F and variance, v_F.

   - Show that $u(F) = E_F - \frac{1}{4}v_F$ is not consistent with the assumptions of expected utility theorem. For this consider the mixture of each of the lotteries [1] and $0.5[0] \oplus 0.5[4]$ with $0.5[0] \oplus 0.5[2]$.
   - Show that $u(F) = E_F - (E_F)^2 - v_F$ is consistent with the assumptions of expected utility theorem (i.e., a Bernouli utility function).

3. Show that if a preference relation $\succeq$ over $L(Z)$ satisfies independence and continuity, then one of the best lotteries in $L(Z)$ is a degenerate lottery and one of the worst lotteries in $L(Z)$ is a degenerate lottery.

4. In the "Demand for insurance" problem, consider the scenarios when the insurance is not actuarially fair. In particular, describe the level of insurance (with respect to D) if $q > \pi$ and $q < \pi$.

5. Show that for any two Bernouli utility functions u_1 and u_2, the following two statements are equivalent.

   (a) $r_A(x, u_2) \geq r_A(x, u_1)$ for all x.

   (b) $c(F, u_2) \leq c(F, u_1)$ for all F.