EconS 527- Homework #3 (Due on September 26th, 2018)

1. The certainty equivalent of a lottery is the amount of money you would have to be given with certainty to be just as well-off with that lottery. Suppose that your von Neumann-Morgenstern utility function over lotteries that give you an amount *x* if Event 1 happens and *y* if Event 1 does not happen is $U(x, y, \pi) = \pi\sqrt{x} + (1 - \pi)\sqrt{y}$ where π is the probability that Event 1 happens and $1-\pi$ is the probability that Event 1 does not happen.
    a. If π = 0.5, calculate the utility of a lottery that gives you $10,000 if Event 1 happens and $100 if Event 1 does not happen.
    b. If you were sure to receive $4,900, what would your utility be?
    c. Given this utility function and π = .5, write a general formula for the certainty equivalent of a lottery that gives you $*x* if Event 1 happens and $*y* if Event 1 does not happen.
    d. Calculate the certainty equivalent of receiving $10,000 if Event 1 happens and $100 if Event 1 does not happen.

2. Textbook H. Varian (Third Edition), Chapter 11, question 11.6 (Page 195)

3. Assume that your utility function over income, x, is given by $u(x) = \sqrt{x}$, i.e., a Cobb-Douglas type. You have been offered two wage offers.
    - In the first one you will receive a fixed salary of $54,000.
    - In the second one, you will only receive $4,000 as a fixed payment, plus a bonus of $100,000 if the firm is profitable. The probability that the firm goes profitable (and thus you get a total salary of $104,000) is 0.5, while the probability that the firm does not make enough profits is 0.5.

    a) Find the expected value of the lottery induced by accepting the second wage offer.
    b) Find the expected utility associated with the second offer.
    c) Draw an approximate figure where the following elements are illustrated:
        i. Utility function (either concave, linear or convex);
        ii. Utility level from the first wage offer;
        iii. Utility level from each of the two possible outcomes of the second wage offer.
        iv. Expected utility level from the second wage offer.
    d) Using your answers from parts (a) and (b), find the risk premium associated with the second offer.
    e) What amount of money should the first wage offer propose in order to make you indifferent between accepting the first and the second wage offers?

4. Consider the family of utility functions with Hyperbolic Absolute Risk Aversion (HARA) as follows $u(x) = \frac{1}{\beta-1}(\alpha + \beta x)^{\frac{\beta-1}{\beta}}$

    where $\beta \neq 0$ and $\beta \neq 1$. Find the Arrow-Pratt coefficient of absolute risk-aversion, $r_A(x, u)$.