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Risk Management
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Problem Set #4

Name: _____

Problem 1.
Investor A has a square root utility function (i.e., $U(W) = \sqrt{W}$), whereas Investor B has a logarithmic utility function (i.e., $U(W) = \ln W$). Both investors have initial wealth $W_0 = \$100$ and must decide how much how much to invest in a bond and how much to invest in a stock. The current prices of the bond and stock are B_0 and S_0 respectively. Although neither security pays dividends or interest, both investors expect to receive income from selling these securities at their end-of-period prices, which are B_1 for the bond and S_1 for the stock. Since the bond is riskless, its end-of-period price is known with certainty to be $B_1 = B_0(1+r)$, where r is the riskless rate of interest. The price of the stock at $t = 1$ can be high or low; i.e., it will be $S_0(1+s)$ with probability .6 and it will be $S_0(1\text{-}s)$ with probability .4. Furthermore, assume that $W_0 = \$100$, $r = .05$, and $s = .3$.

A. How much (in dollar and percentage terms) of Investor A's initial wealth should be invested in the stock and in the bond?

B. How much (in dollar and percentage terms) of Investor B's initial wealth should be invested in the stock and in the bond?

C. Who is more risk averse - Investor A or Investor B? Explain why.

D. Recalculate your answers for parts A and B assuming initial wealth of \$200 rather than \$100.

Problem 2.
Consider two mutually exclusive risky investments, 1 and 2, with payoffs given by:

$$W_1 = \begin{cases} \$2 \text{ with probability } 10\% \\ \$6 \text{ with probability } 80\% \\ \$10 \text{ with probability } 10\% \end{cases} \quad \text{and } W_2 = \begin{cases} \$4 \text{ with probability } 45\% \\ \$8 \text{ with probability } 55\% \end{cases}$$

Assume that your initial wealth (W_0) is \$0, and your utility $U(W) = W^n$, where $0 < n < 1$.

A. Does either investment first order stochastically dominate the other investment?

B. Does either investment second order stochastically dominate the other investment?

C. Suppose that your "n" value is .5; i.e., $U(W) = W^{.5}$. Which investment provides higher expected utility, investment 1 or investment 2?

D. Explain why all possible values of n greater than 0 and less than 1 result in the same conclusion as indicated in part C of this problem.