a) Suppose you are exposed to a situation that results in a 50/50 chance of winning or losing $1000. If you can buy insurance that completely removes the risk for a fee of $125, will you buy it or take the gamble?

b) Suppose you accept the gamble outlined in (a) and lose, so that your wealth is reduced to $4000. If you are faced with the same gamble and have the same offer of insurance as before, will you buy the insurance the second time around?

4.4 Assume that you have a logarithmic utility function for wealth $U(W) = \ln(W)$ and that you are faced with a 50/50 chance of winning or losing $1,000. How much will you pay to avoid this risk if your current level of wealth is $10,000? How much would you pay if your level of wealth were $1,000,000?

4.5 Given the exponential utility function $U(W) = -e^{-aW}$.

a) Graph the function, assuming $a > 0$.

b) Does the function exhibit positive marginal utility and risk aversion?

c) Does the function have decreasing absolute risk aversion?

d) Does the function have constant relative risk aversion?

4.6 What kind of utility function of wealth might be consistent with an individual gambling and paying insurance at the same time?

4.7 Suppose that $A > B > C > D$ and that the utilities of these alternatives satisfy $U(A) + U(D) = U(B) + U(C)$. Is it true that $U(\frac{1}{2}B + \frac{1}{2}C)$ is greater than $U(\frac{1}{2}A + \frac{1}{2}D)$ because the former has a smaller variance? Why or why not?

4.8 A small businesswoman faces a 10% chance of having a fire that will reduce her net worth to $1.00, a 10% chance that fire will reduce it to $50,000, and an 80% chance that nothing detrimental will happen, so that her business will retain its worth of $100,000. What is the maximum amount she will pay for insurance if she has a logarithmic utility function? In other words, if $U(W) = \ln W$, compute the cost of the gamble. [*Note:* The insurance pays $99,999 in the first case; $50,000 in the second; and nothing in the third.]

4.9 If you are exposed to a 50/50 chance of gaining or losing $1000 and insurance that removes the risk costs $500, at what level of wealth will you be indifferent relative to taking the gamble or paying the insurance? That is, what is your certainty equivalent wealth? Assume your utility function is $U(W) = -W^{-1}$.

4.10 Consider a lottery that pays $2 if n consecutive heads turn up in $(n + 1)$ tosses of a fair coin (i.e., the sequence of coin flips ends with the first tail). If you have a logarithmic utility function, $U(W) = \ln W$, what is the utility of the expected payoff? What is the expected utility of the payoff?

4.11 (Our thanks to David Pyle, University of California, Berkeley, for providing this problem.) Mr. Casadesus's current wealth consists of his home, which is worth $50,000, and $20,000 in savings, which are earning 7% in a savings and loan account. His (one-year) homeowner's insurance is up for renewal, and he has the following estimates of the potential losses on his house owing to fire, storm, etc., during the period covered by the renewal:

Value of Loss, $	*Probability, %*
0	.98
5,000	.01
10,000	.005
50,000	.005