1. If Paul is risk loving and his basketball team has a probability of .5 of winning, then Paul would rather bet \$10 on his team than \$100. (When Paul bets X, he wins X if his team wins and loses X if his team loses.) T/F?

2. Socrates owns just one ship. The ship is worth \$200 million dollars. If the ship sinks, Socrates loses \$200 million. The probability that it will sink is .02. Socrates' total wealth including the value of the ship is \$225 million. He is an expected utility maximizer with von Neuman-Morgenstern utility U(W) equal to the square root of W. What is the maximum amount that Socrates would be willing to pay in order to be fully insured against the risk of losing his ship?

3. Ronald has \$18,000. But he is forced to bet it on the flip of a fair coin. If he wins he has \$36,000. If he loses he has nothing. Ronald's expected utility function is  $.5x^{.5} + .5y^{.5}$ , where x is his wealth if heads comes up and y is his wealth if tails comes up. Since he must make this bet, he is exactly as well off as if he had a perfectly safe income of how much?

12.11 (2) 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  $\pi$  is the probability that Event 1 happens and  $1 - \pi$  is the probability that Event 1 does not happen.

(a) If  $\pi = .5$ , 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  $\pi = .5$ , 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.

12.13 (0) Portia has been waiting a long time for her ship to come in and has concluded that there is a 25% chance that it will arrive today. If it does come in today, she will receive \$1,600. If it does not come in today, it will never come and her wealth will be zero. Portia has a von Neumann-Morgenstern utility such that she wants to maximize the expected value of  $\sqrt{c}$ , where c is total income. What is the minimum price at which she will sell the rights to her ship?

6) Tom Cruiser's car is worth \$100,000. But Tom is careless and leaves the top down and the keys in the ignition. Consequently his car will be stolen with probability .5. If it is stolen, he will never get it back. Tom has \$100,000 in other wealth and his von Neumann-Morgenstern utility function for wealth is u(w) = ln(w). Suppose that Tom can buy \$K worth of insurance at a price of \$.6K. How much insurance will Tom buy?