Questions 1 & 2 refer to the following information:

You are the manager of a baseball team. Your team is at bat, it is the bottom of the ninth inning, the score is tied, there is one out, and you have a runner on 2nd base. If the runner on 2nd scores, you win the game. If the runner on 2nd does not score before you reach three outs, the game will go to extra innings.

For each of the next batters to come to the plate, you can tell them to hit a sacrifice fly or try to get a hit. If you tell the batter to sacrifice they will be out 100% of the time, but the runner on base will successfully advance by one base 90% of the time.

If you tell the batter to try to get a hit, they will get a multi-base hit 10% of the time, a single 20% of the time, and will be out 70% of the time. Assume, for the sake of simplicity, that your batters will not walk. In the event of a multi-base hit, the runner on base will score and you will win the game. A single will cause the runner on base to advance by one base and your out total will remain the same. If your batter tries to get a hit and is out, the runner on base will not advance.

If you reach three outs at the same time that the runner on base would score, the inning will end before the runner scores, so it will never make sense to sacrifice with two outs.

1) Should you tell your next batter to sacrifice or try to get a hit?

2) What is your probability of winning the game this inning?

Questions 3 & 4 refer to the following information:

You are representing the plaintiff in a personal injury case. Your client was injured in an auto accident and is suing the other driver (the defendant). Unfortunately, there is considerable doubt about who was at fault in the accident.

The defendant's attorney has offered to settle with your client for $225K. You can either accept this settlement offer or you can go to trial. If you choose to go to trial, the settlement offer will be taken off the table.

At trial, one of the most important steps will be to select a jury. If jury selection goes well and you wind up with a favorable jury, you stand a 60% chance of winning the trial. If the jury selection does not go in your favor, you stand only a 50% chance of winning the trial.

Under normal circumstances you have a 30% chance of selecting a favorable jury. You can, however, boost your chances of getting a favorable jury up to 70% if you hire a jury selection expert. The cost to hire a jury selection expert is $50K.

If you win the case, your client will receive $400K minus the expense of the jury selection expert, if you chose to hire one. If you lose the case, your client will receive no money but will still be liable for the expense of the jury selection expert, if hired.

3) Should you go to trial or settle?

4) Now assume that the defendant has an aversion to losing the case beyond just the monetary cost. If jury selection goes favorably for you, you believe that the defense counsel will make a new settlement offer of $300K. Now should you go to trial or settle? If you go to trial, should you hire a jury selection expert?

Questions 5 & 6 refer to the following information:

You are the proud owner of a collectible action figure based on a popular 1990s cartoon. The figure is still in its original packaging and is rather valuable to collectors. You could sell the figure in an online auction today for its market value of $100. In addition, you have a friend who is not interested in the market price of the action figure but wants to buy it so that he can open the package and display the figure on his bookshelf (and maybe play with it sometimes). He will also pay you $100 for the toy.

In addition to selling the figure now via the open market or to your friend, you may also choose to hold on to the figure for another year. Every year that you do not sell the figure its market price may rise by $20 (40% chance), remain the same (40% chance), or fall by $20 (20% chance). Meanwhile, your friend is impatient; every year that you wait to sell him the toy, his offer declines by $10.

Finally, there is a major motion picture currently in development which hopes to resurrect your action figure's franchise. Unfortunately, the movie looks like it will be terrible. You anticipate that, after two years, this movie will have destroyed the reputation of the franchise (even to your friend) and your action figure will be worthless. To redeem any value from your collectible figure, you cannot wait more than two years to sell it.

5) If you utilize all of your options to maximize the value at which you can sell the figure, what is its expected value to you today?

6) Up to how much would you be willing to pay now for a booklet that will tell you whether the price of the figure will rise, fall, or remain the same next year? Assume that this booklet is only available this year to predict next year's price change; a similar booklet will not be available again next year.

Questions 7 & 8 refer to the following information:

You are the captain of a Spanish treasure fleet sailing from Montevideo to Cádiz near the beginning of the 19th Century. Your ally, France, is at war with Great Britain and you suspect that ships of the British Navy may attempt to intercept you in order to capture the treasure you are sailing with.

Your fleet consists of three frigates serving as escorts and one transport galleon which is loaded with £1,000,000 in gold and silver coins. Your probability of being attacked by a British squadron is 40%. Even if you are attacked, you still stand a 50% chance of escaping with the treasure back to Spain.

You have three options available to you to mitigate the risk of losing your treasure to the British. Because it is late in the season and you must get underway, you will only have enough time to implement one of these options (at most) before you must sail.

Option 1: You can increase the size of your escort by adding two frigates. This will cost £100,000 but will both deter the British, reducing the risk of attack to 20%, and increase your chances of escaping if you are attacked to 60%.

Option 2: You can careen (clean the bottoms and sides of) your ships and add additional sails in order to make your fleet faster. This action will cost £20,000 and will increase your probability of escape if you are attacked to 60%. It will not reduce your risk of being attacked.

Option 3: You can buy another transport galleon and split the treasure evenly (£500,000 each) between the two vessels. In addition to costing £40,000, this will actually increase your probability of being attacked to 45%. If you are attacked, you will stand a 50% chance of losing at least one galleon, but only a 10% chance of losing both.

7) Including sailing with no additional actions taken, what is your best option?

8) Up to how much would you be willing to pay a spy to learn the location of the British fleet, allowing you to avoid them with 100% certainty?

Questions 9 & 10 refer to the following information:

You are a real estate developer and you have your eyes on four adjacent properties that just went on the market. Each of the properties is identical and the asking price for each property is $360,000. You anticipate that these properties will be in high demand and will all sell quickly.

Each individual property is worth $450,000 to you as a developer but, if you can manage to purchase all four properties, then together their value to you will be $2,800,000.

You have exactly $2,000,000 available on hand to make offers on the properties. For each property, you can either make an offer at the asking price or submit an overbid of 150% of the asking price that will immediately end the bidding and ensure that the property is yours. If you submit an offer at the asking price, you will only have a 40% chance of winning the bidding for the property.

9) What is your probability of winning the bidding for all four properties if you submit an offer at the asking price for all four?

10) How many properties should you overbid on to maximize your profits?