Decision Tree Applications

Fix the Car or Junk It?

The oil pump failed on your car. There's a 60% chance the engine is ruined as well but you can't tell whether it is until after the oil pump is repaired. Fixing the oil pump would cost $700. If the engine is ruined, repairing it would cost an additional $1200. Alternatively, you could junk the car and replace it with an equivalent car for $1400.

If your objective is to minimize expected cost, should you fix the oil pump or not? If you decided to fix the oil pump and then found the engine was ruined, should you junk the car or do the additional repairs? Why or why not?

Which job? Value of Future Growth Potential

A) Only the immediate:

You have two job offers. One is for a plant superintendent in Iowa, which has a present value of income streams of $1M. The other is a job in the General Offices (G/O), with a present value of $1.1M. Draw a tree diagram for this immediate decision, ignoring all future events. If your only interest is to maximize present value, which would you take?

B) What Happens Next? 5 Years out.

Neither position is necessarily a dead-end job. In Iowa there is a 70% probability of being promoted to plant manager in a few years, which would have an NPV of $1.5M. The probability of promotion at the G/O is only 20%, but the NPV would be $1.6M. Draw another tree showing these future events and calculate EMV's for the alternatives. Given these additional future possibilities, which job would you pick to maximize EMV?

C) The Value of Future Options -- 10 Years out.

At the G/O, if you're not promoted, you may still choose to quit your job and find a better one outside the company, raising NPV to $1.4M. The plant is in such a desolate location, and you would have become so specialized that there are no outside opportunities in Iowa. You can't move. Draw a new tree showing your future option to stay or find a new job if you're at the G/O and haven't been promoted.

D) Value of advance information.

  How much would it be worth to you (EVPI) to have prior knowledge of whether or not the G/O job will grow? Consider future options and assume no new information about promotion at the plant.

Income Tax Deductions and Audit Risk

You have a one time opportunity this year to make some substantial deductions on your income tax that would reduce your taxes by $10,000. Although these are completely legitimate, the amounts are unusual enough that you would increase the probability of being audited from 10% to 60%. In the event you're audited, a number of other previous deductions will be disallowed resulting in charges of $40,000. However, You can appeal the audit ruling with a 70% chance of winning. Your court costs for the appeal would be $10,000 whether you win or lose. Should you claim the deductions?

High option vs. Low Option Health Insurance Plans

You're trying to decide whether to buy the High option health insurance plan for $700 or the low option plan for $500. The difference between the two plans is that the high option plan has major dental coverage with a $50 deductible (amount not covered, that you have to pay). there is a 60% chance that you're going to need major dental work in the next year, which would cost $500 if you don't have dental coverage.
You can upgrade from the low option to high option plan later (after you know whether the dental work is necessary) for an additional $400.

Should you make an insurance claim even though it may raise your rates?

You've just had a minor automobile accident in your driveway. There is no legal requirement to report the accident, but you're wondering whether you should put in an insurance claim for the $300 in damage. Your "accident free" rate on your insurance policy would be unaffected by this one claim, but if you had another claim in the next 3 years, your rates would go up enough to cost you an extra $1000 (present value). Of course, you could always claim this accident and choose not to claim a future accident if it happens. There are three possible future states (adjusted to present values): no accident (P=.5), a $300 accident (P=.2), or a $1200 accident (P=.3). For simplicity, assume that the accident free rate will be eliminated after three years due to changes in the insurance laws, so any accidents beyond this planning horizon would be irrelevant.
Should you report the first accident and claim compensation ?

Is 100% Audit of Invoices really necessary?

In the spirit of Just-in-Time inventory management, ABC Co. has a partnership arrangement with one of its vendors and has decided to eliminate 100% audit of invoices.   As a result, the vendor could overcharge on the invoices and there would only be a 10% chance that ABC would discover it. Suppose the two plan to do enough business this year that the vendor would net $1M. If the vendor cheats without getting caught, he could make an additional $1M. If ABC discovered the cheating, the vendor would be sued and would lose the $1M gained through cheating, the normal $1M profit, and would be eliminated from future business with ABC. The present value of future business is $10M. If ABC is unaware of any overcharges, the probability of a contract renewal is 60%.
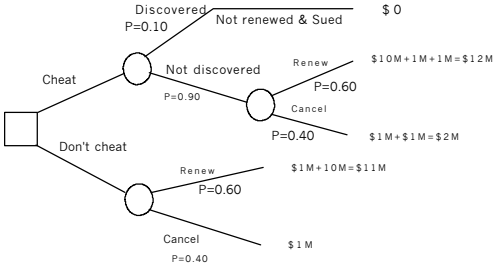
A) Under these conditions, would the vendor have incentive to cheat or be honest?

B) How high would the probability of discovery have to be to eliminate the incentive to cheat (indifferent between cheating or not)?

C) What are three other things that could be changed to reduce the incentive to cheat?