

IEMS 326, Homework 4, Due 2/16/2011

1. The Metal Discovery Group (MDG) is a company set up to conduct geological explorations of parcels of land in order to ascertain whether significant metal deposits (worthy of further commercial exploitation) are present or not. Current MDG has an option to purchase outright a parcel of land for £3m.

If MDG purchases this parcel of land then it will conduct a geological exploration of the land. Past experience indicates that for the type of parcel of land under consideration geological explorations cost approximately £1m and yield significant metal deposits as follows:

- manganese 1% chance
- gold 0.05% chance
- silver 0.2% chance

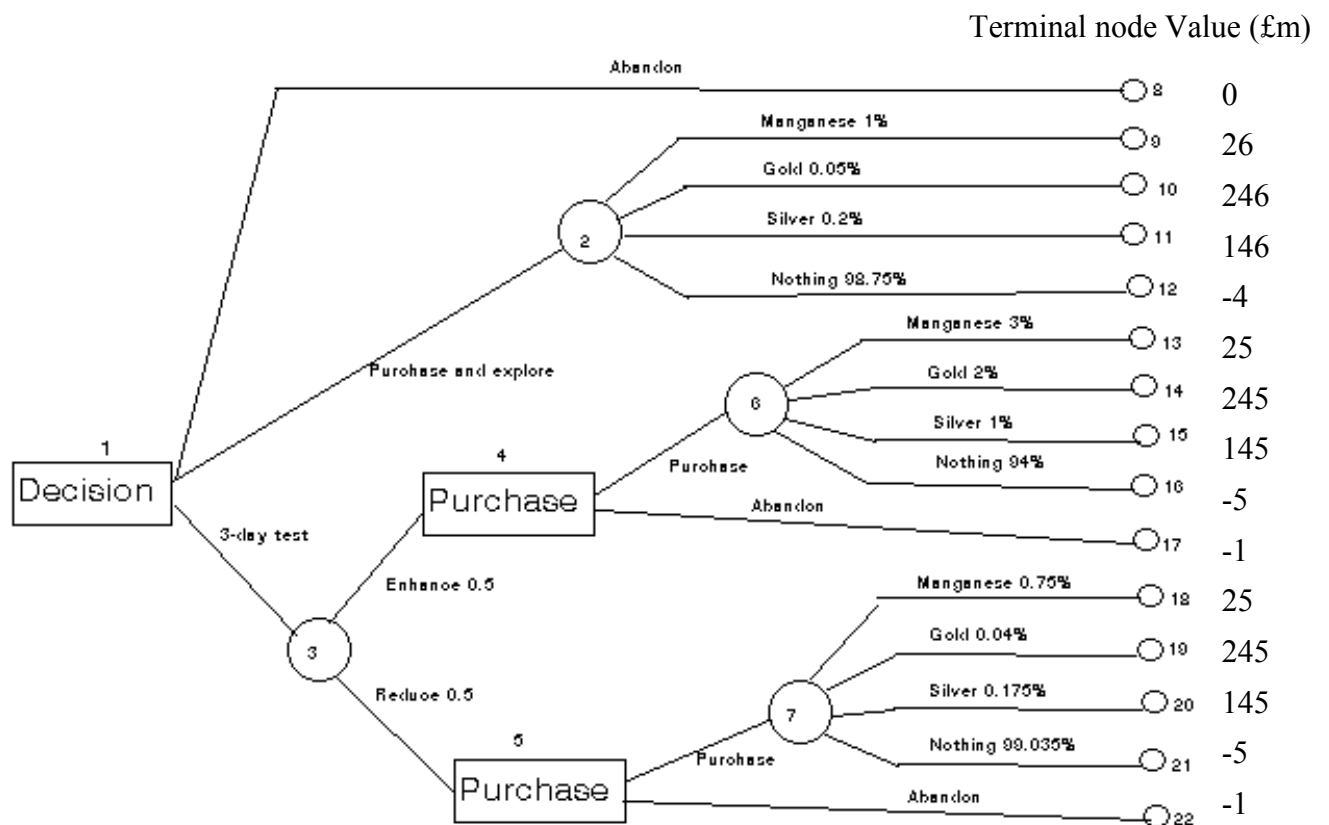
Only one of these three metals is ever found (if at all), i.e. there is no chance of finding two or more of these metals and no chance of finding any other metal. If manganese is found then the parcel of land can be sold for £30m, if gold is found then the parcel of land can be sold for £250m and if silver is found the parcel of land can be sold for £150m.

MDG can, if they wish, pay £750,000 for the right to conduct a three-day test exploration before deciding whether to purchase the parcel of land or not. Such three-day test explorations can only give a preliminary indication of whether significant metal deposits are present or not and past experience indicates that three-day test explorations cost £250,000 and indicate that significant metal deposits are present 50% of the time.

If the three-day test exploration indicates significant metal deposits then the chances of finding manganese, gold and silver increase to 3%, 2% and 1% respectively. If the three-day test exploration fails to indicate significant metal deposits then the chances of finding manganese, gold and silver decrease to 0.75%, 0.04% and 0.175% respectively.

What would you recommend MDG should do and why? Solve the decision tree.

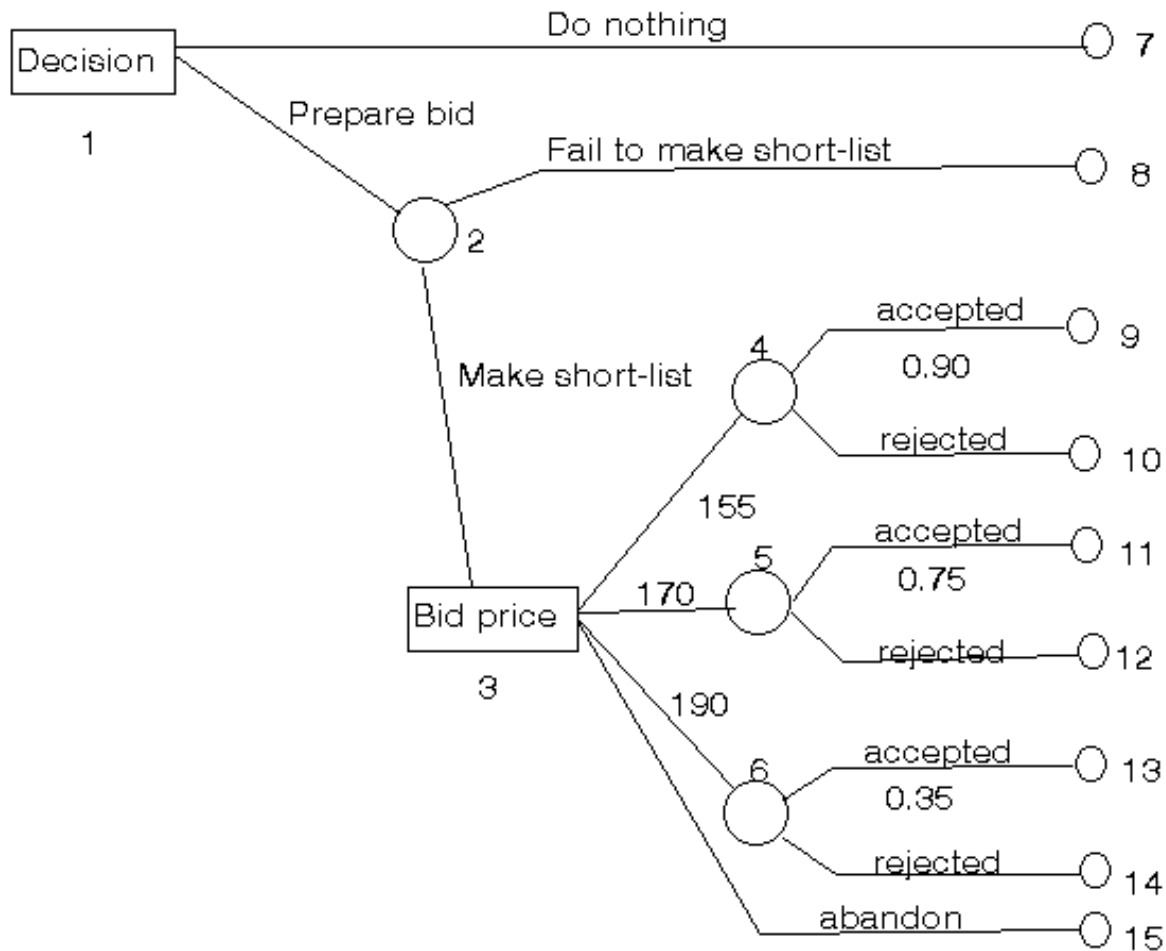
I've drawn the decision tree for you and calculated the value of the terminal nodes.



2. A company is trying to decide whether to bid for a certain contract or not. They estimate that merely preparing the bid will cost £10,000. If their company bid then they estimate that there is a 50% chance that their bid will be put on the "short-list", otherwise their bid will be rejected. Once "short-listed" the company will have to supply further detailed information (entailing costs estimated at £5,000). After this stage their bid will either be accepted or rejected. The company estimate that the labour and material costs associated with the contract are £127,000. They are considering three possible bid prices, namely £155,000, £170,000 and £190,000. They estimate that the probability of these bids being accepted (once they have been short-listed) is 0.90, 0.75 and 0.35 respectively.

What should the company do and what is the expected monetary value of your suggested course of action? Solve the decision tree.

I've drawn the decision tree for you, but not calculated the value of the terminal nodes.



3. Buzzy-B Toys must decide the course of action to follow in promoting a new whistling yo-yo. Initially, management must decide whether to market the yo-yo or to conduct a test marketing program. After test marketing the yo-yo, management must decide whether to abandon it or nationally distribute it.

A national success will increase profits by \$500,000, and a failure will reduce profits by \$100,000. Abandoning the product will not affect profits. The test marketing will cost Buzzy-B a further \$10,000.

If no test marketing is conducted, the probability for a national success is judged to be 0.45. The assumed probability for a favorable test marketing result is 0.50. The conditional probability for national success given favorable test marketing, is 0.80, for national success given unfavorable test results, it is 0.10.

Construct the decision tree and solve it. Make sure to label the nodes. Don't forget the probabilities.