E: Imperfect information, part 1

Extend analysis to handle information that may be incorrect

Key intuition:

Information *reduces* but does not eliminate uncertainty

Example 1: testing a used car

Car price is $2500
Car condition is uncertain:

State	Probability	Value
Good (G)	30%	$4000
Bad (B)	70%	$1000

Test is available:

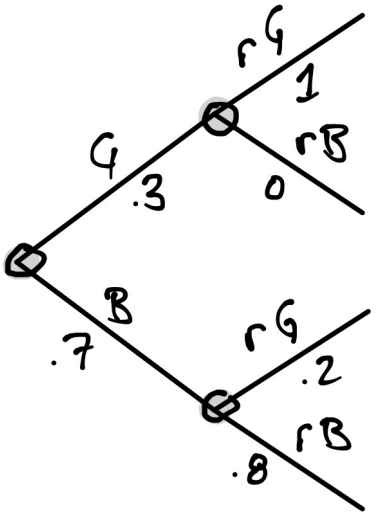
Costs $100
Reports whether the car is good (rG) or bad (rB)

Test characteristics:

- **Never reports problems in good cars**
  Never says rB if car is G
  No false positives

- **Misses problems in bad cars 20% of the time**
  May report rG when car is B
  Some *false negatives*

Report depends on true condition so it's **to the right** in the tree:

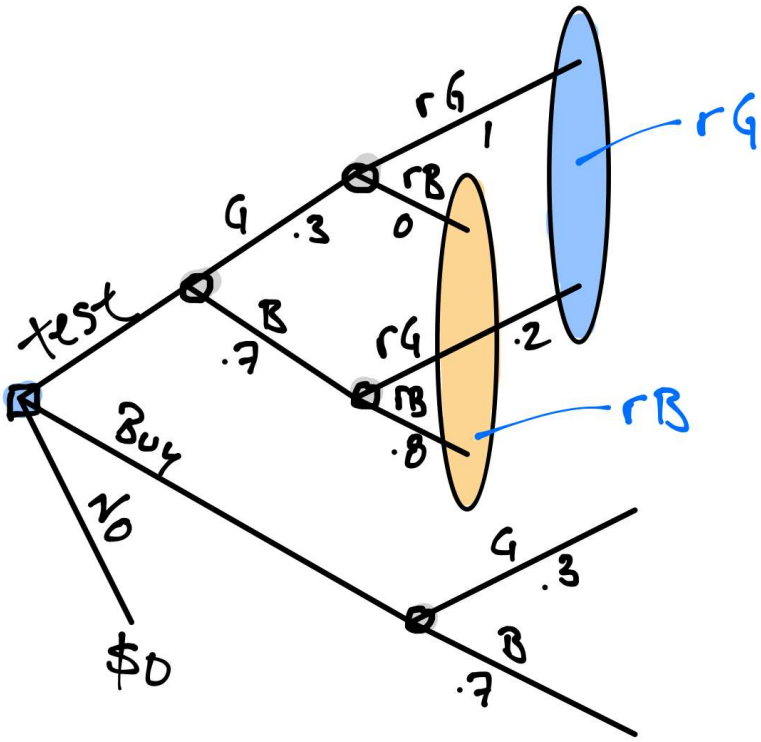


Expressing as a table:

True state	Report	Prob of report
G	rG rB	100% 0%
B	rG rB	20% 80%

Start building the decision tree:

Two **information sets**:



Blue:
have report rG

Orange:
have report rB

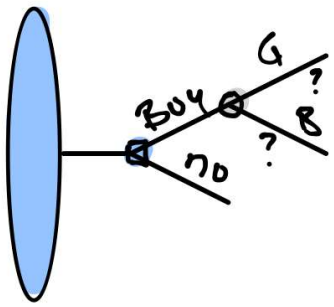
After test results received:

Report rG: *Uncertain*: car *might* be good -- a B car *might* get rG

Report rB: *Certain*: car is *definitely* bad -- a G car *never* gets rB

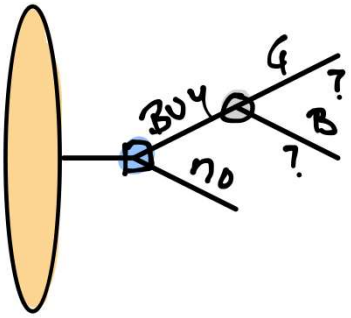
In **either** case, next node is decision **whether to buy**:

rG:



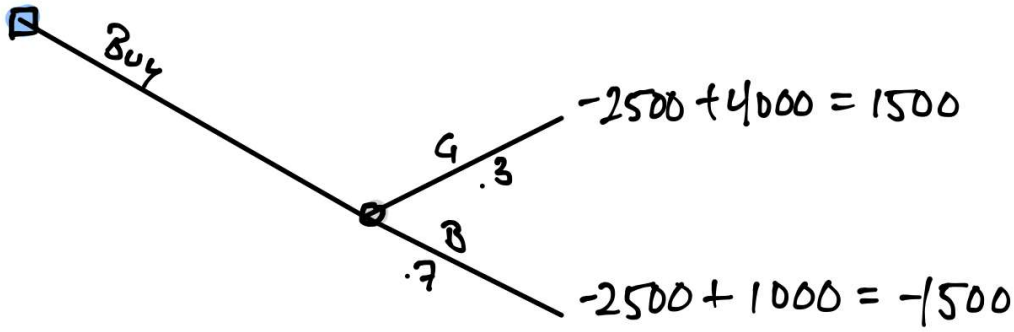
Probabilities:
will need to
calculate

rB:



Probabilities:
pr G = 0
pr B = 100%

Evaluate Buy (without testing) branch to simplify tree:



EV = 0.3*1500 + 0.7*(-1500) = -600

Don't buy (without the test)

Analysis will continue in part 2