

9/23/09

Decision Analysis

Company GFB owns a plot of land.

<u>Alternatives</u>	<u>Payoffs</u>	
	<u>Oil</u>	<u>Dry</u>
Drill	700k	-100k
Sell Land	90k	90k
Apriori probability	.25	.75

Decision Strategies:

- (i) Choose the alternative that maximizes the minimum profit — **sell**
- (ii) Choose alternative that maximizes payoff under the most likely alternative — **sell**
- (iii) Choose alternative that maximizes expected profit:

$$\text{Drill} : \frac{1}{4} \times 700 - \frac{3}{4} \times 100 = 100$$

$$\text{Sell} : 90$$

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Introduce a 3rd alternative:

Do a Seismic Study (SS) and then make decision. Cost of survey = 30K

Outcome of test : FSS $\equiv$ Favorable
VSS $\equiv$ Unfavorable.

$$P[FSS | Oil] = .6 \quad P[VSS | Oil] = .4$$

$$P[FSS | Dry] = .2 \quad P[VSS | Dry] = .8$$

$$P[FSS] = P[FSS | Oil] P[Oil] + P[FSS | Dry] P[Dry] = .6 \times .25 + .2 \times .75 = .3$$

Bayes Computation:

$$P[012 | FSS] = \frac{P[012 \wedge FSS]}{P[FSS]} =$$

$$\frac{P[FSS | 012] \times P[012]}{P[FSS | 012] P[012] + P[FSS | 01y] P[01y]}$$

$$\frac{.6 \times .25}{.6 \times .25 + .2 \times .75}$$

$$= \frac{1}{2}$$

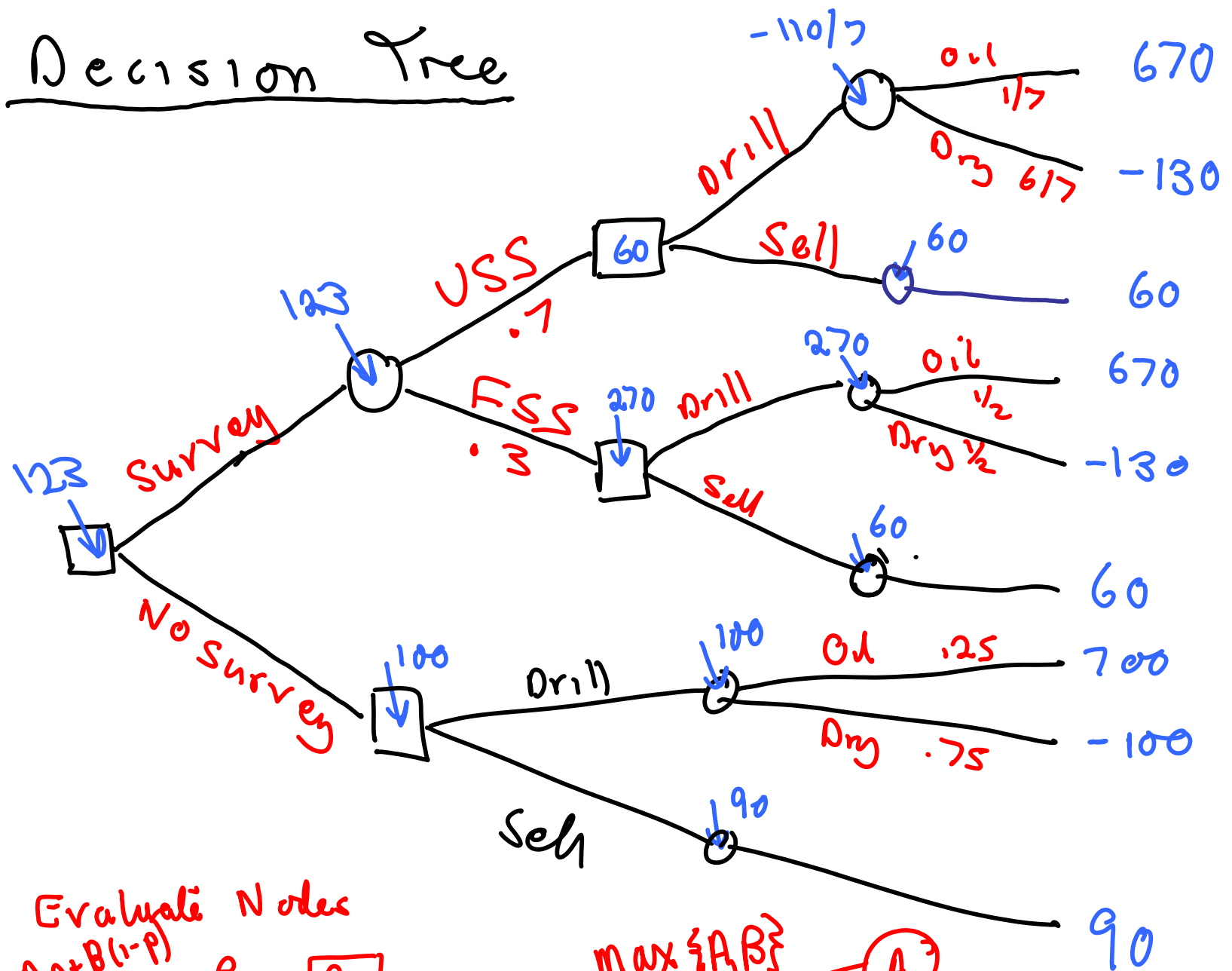
$$P[0,1 | FSS] = \frac{1}{2}$$

$$P[Dy | FSS] = \frac{1}{2}$$

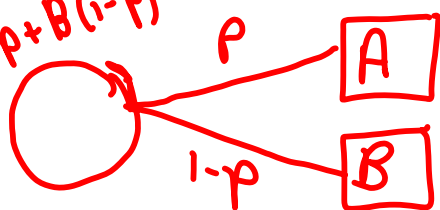
$$P_r[0,1 | USS] = \frac{1}{2}$$

$$P_r[Dy | USS] = \frac{6}{7}$$

Decision Tree



Evaluate Nodes
 $Ap + B(1-p)$



$\max\{A, B\}$

