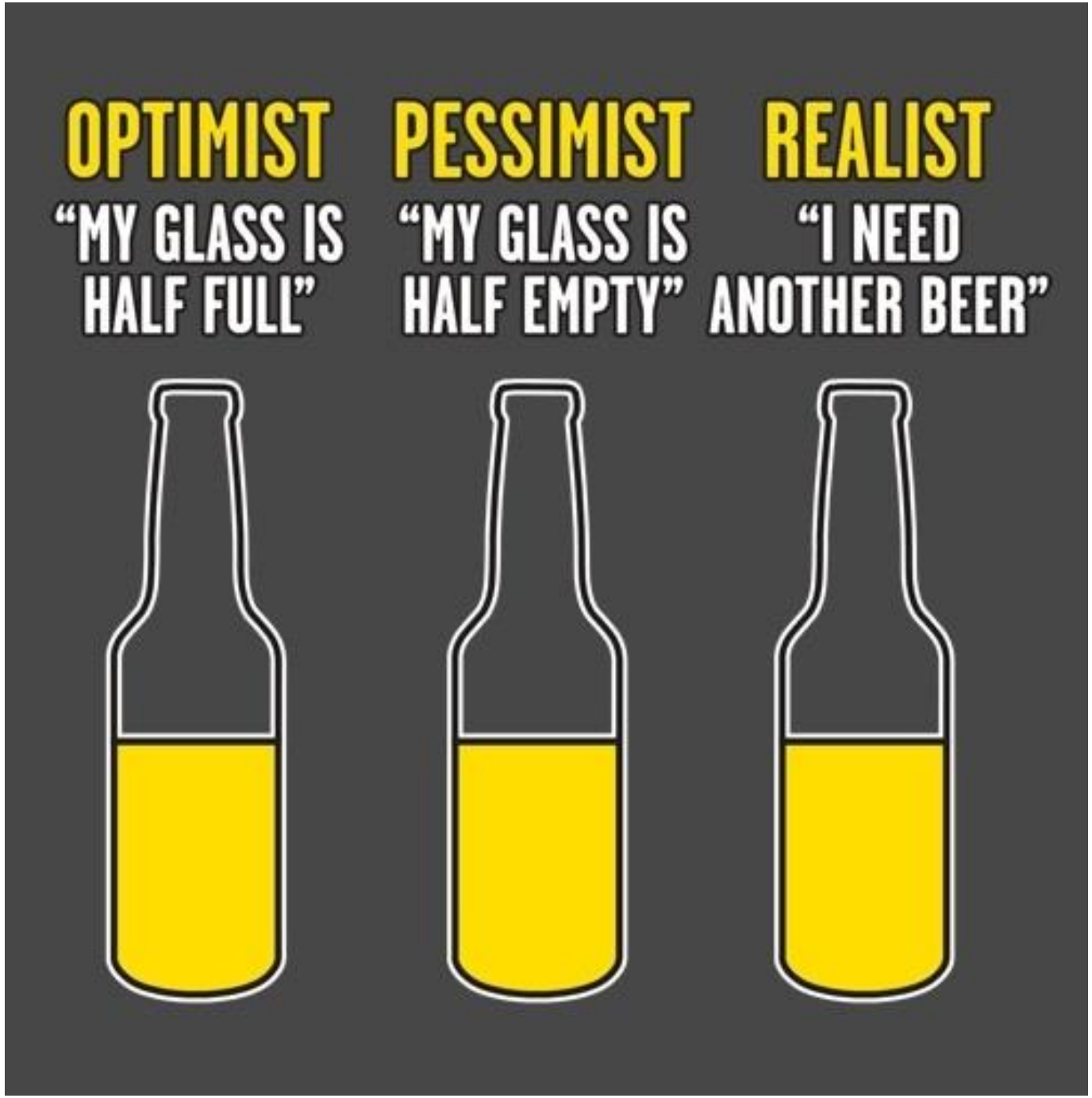
Decision Analysis

- ✓ A company owns a tract of land that may contain OIL
- ✓ One chance in four that land may contain OIL
- ✓ Revenue in case of finding oil is $800,000. Drilling cost $100,000.
- ✓ If land is sold revenue would be $90,000

Alternatives	**States of land**	
	Oil	Dry
Drill for oil	$700,000	-$100,000
Sell the land	$90,000	$90,000
Prior probability	P(oil) = 0.25	P(dry) = 0.75

Decisions; State of nature; Payoff table

- ✓ Optimist decision maker
- ✓ Pessimist decision maker
- ✓ Realist decision maker



Maximax pay-off criterion

- ✓ Ignore the probabilities
- ✓ Best of best payoffs

Alternatives	**Status of land**	
	Oil	Dry
Drill for oil	$700,000	-$100,000
Sell the land	$90,000	$90,000
	P(oil) = 0.25	P(dry) = 0.75

The decision here would be??

Maximin pay-off criterion

- ✓ Ignore the probabilities
- ✓ Best of worst payoff

Alternatives	**Status of land**	
	Oil	Dry
Drill for oil	$700,000	-$100,000
Sell the land	$90,000	$90,000
	P(oil) = 0.25	P(dry) = 0.75

The decision here would be??

Maximum likelihood criterion

- ✓ Take into account the probabilities

- ✓ Best of pay-offs associated with higher probability

Alternatives	**Status of land**	
	Oil	Dry
Drill for oil	$700,000	-$100,000
Sell the land	$90,000	$90,000
	P(oil) = 0.25	P(dry) = 0.75

The decision here would be??

Bayes Decision Rule

✓Alternative that results in higher expected value

Alternatives	**Status of land**	
	Oil	Dry
Drill for oil	$700,000	-$100,000
Sell the land	$90,000	$90,000
	P(oil) = 0.25	P(dry) = 0.75

The decision here would be??

a) If the company is gasping to survive and can not afford to loose any money what soever. What decision rule should be employed?

b) If the company is plush with abundant cash and can take any risk. What decision rule should be employed?

c) Realistically speaking which decision rule should be adopted?

Sensitivity analysis

- ✓ Identify the range for probability for our decisions.
- ✓ Expected value from drilling = selling the land
- ✓ Crossover point.

Alternatives	**Status of land**	
	Oil	Dry
Drill for oil	$700,000	-$100,000
Sell the land	$90,000	$90,000
	P(oil) = *x*	P(dry) = *1-x*

Alternatives	State of nature		
	S1	S2	S3
A1	220	170	110
A2	200	180	150
Prior probability	0.6	0.3	0.1

1. Which alternative should be chosen under the maximax payoff criterion?
2. Which alternative should be chosen under the maximin payoff criterion?
3. Which alternative should be chosen under Bayes decision rule?
4. Which alternative should be chosen under maximum likelihood criterion.
5. Using Bayes decision rule, perform sensitivity analysis with respect to state S1 and S2 (without changing the prior probability of S3)