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## Decision Theory

### Decision Theory Car Part Replacement Case

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Recently my future son-in-law was faced with the following problem:

- Check engine light came on in car (Jetta). It appeared after some checking to be a sensor called the MAF sensor. He asked me, "Should I buy a new one (\$400) or take a chance on a used one from a salvage yard that came off another Jetta with 18,000 miles on it that cost \$100? (He is worried that a salvage part won't be as reliable as new part.)"
- Can a decision tree help here?

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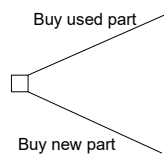
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What are the choices (the actions)?



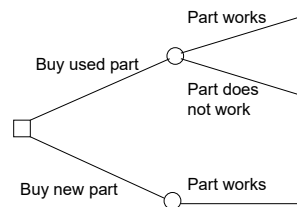
What are the states of nature (the uncertain outcomes)?

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What are the states of nature (the uncertain outcomes)?



What are the probabilities of the uncertain outcomes?

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What are the probabilities of the uncertain outcomes?

What are the payoffs?

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What are the payoffs?

What is the choice that minimizes the cost? Roll back the expected values...

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What are the payoffs?

Buy the used part! Its cheaper.

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But what if the probability part works is lower than 0.90?

What would you do?

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