TUTORIAL 2

GAME THEORY

QUESTION 1

Pepsi's budget

Coke's budget		Low	Medium	High
	Low	$60, $45	$57.50, $50.50	$45, $35
	Medium	$50, $35	$65, $30	$30, $25
	High	$45, $10	$60, $20	$50, $40

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QUESTION 2

Union

Management	0	50	100
0	$0, $0	$0, $50	$0, $100
50	$50, $0	$50, $50	-$1, -$1
100	$100, $0	-$1, -$1	-$1, -$1

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QUESTION 3

Domino's

Crust	High ($10)	Medium ($8)	Low ($6)
High ($10)	$1000, $1,000	$900, $1,100	$500, $1,200
Medium ($8)	$1,100, $400	$800, $800	$450, $500
Low ($6)	$1,200, $300	$500, $350	$400, $400

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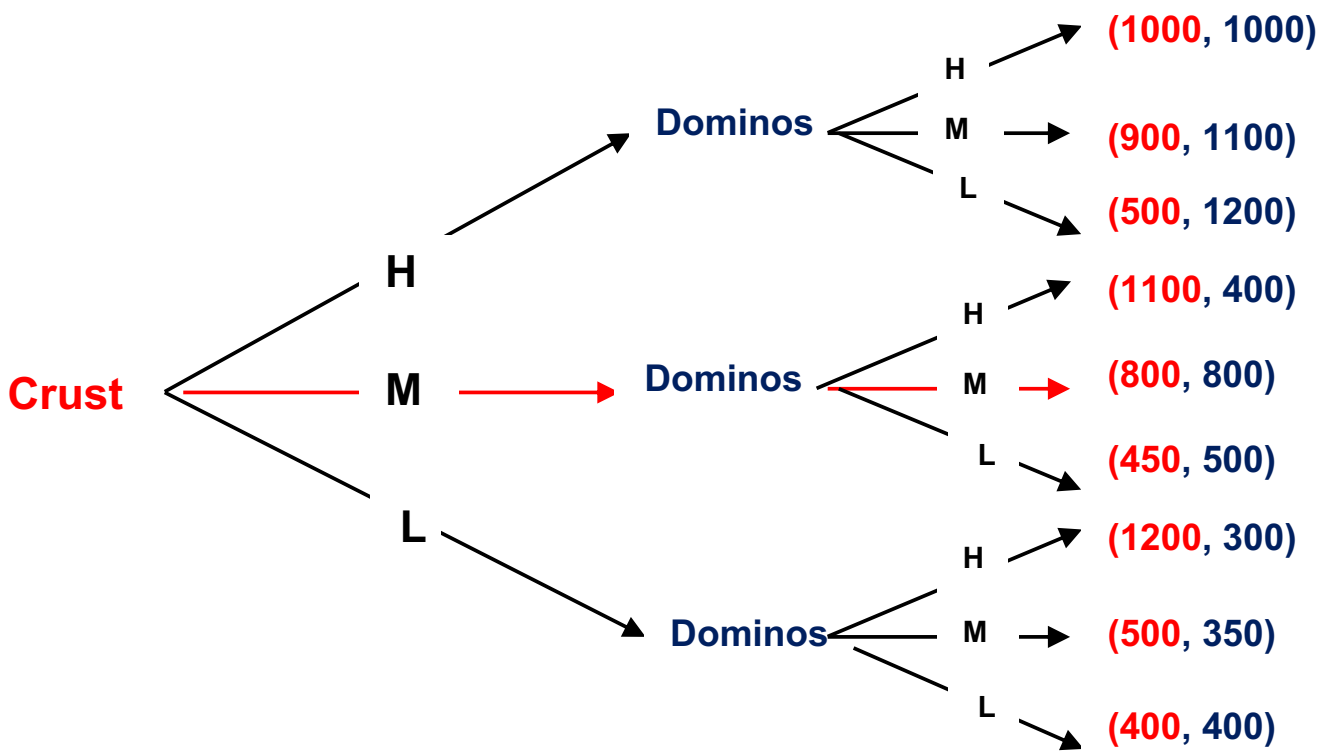
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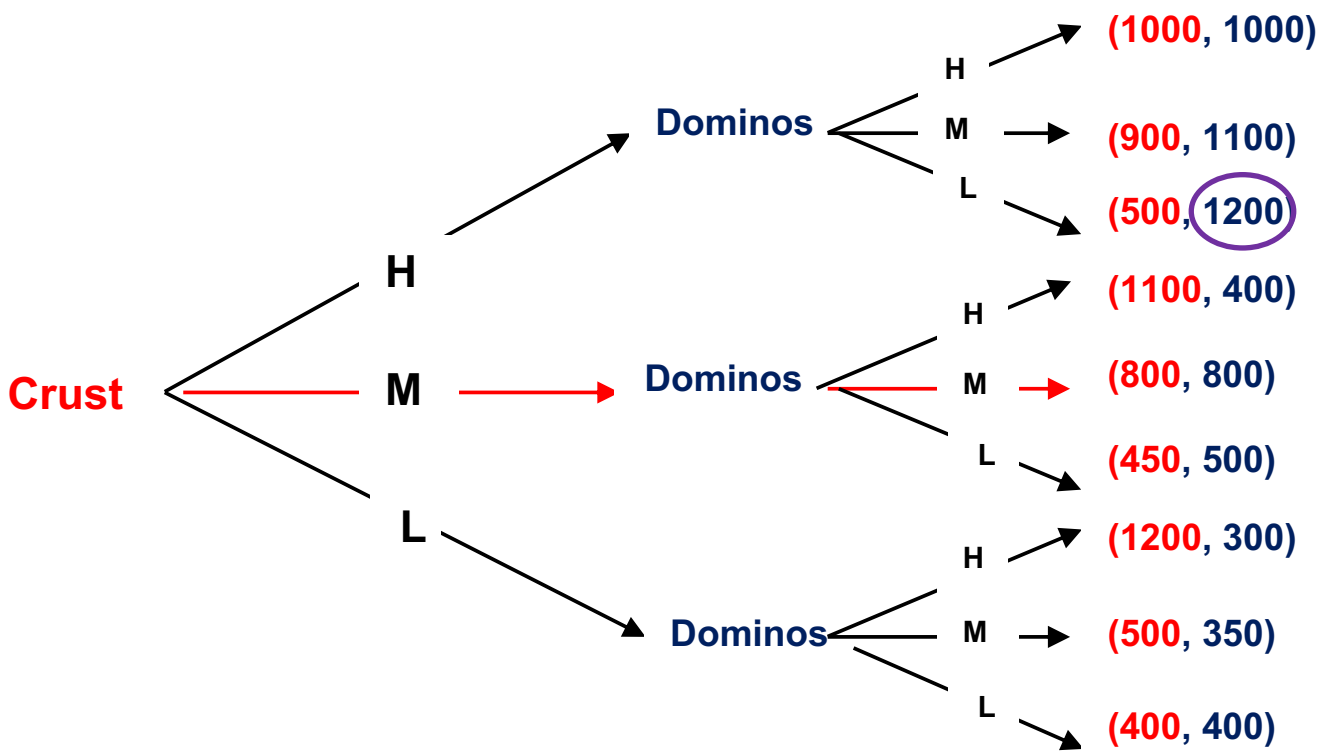
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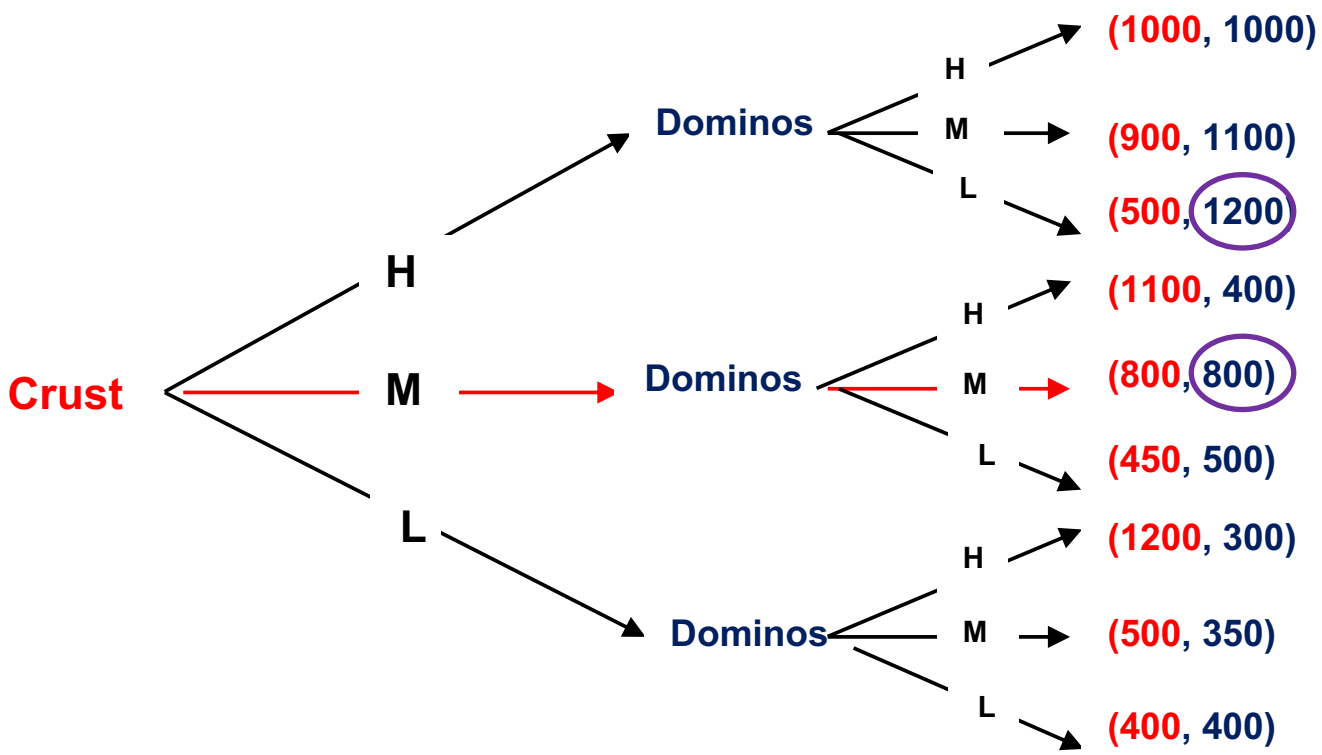
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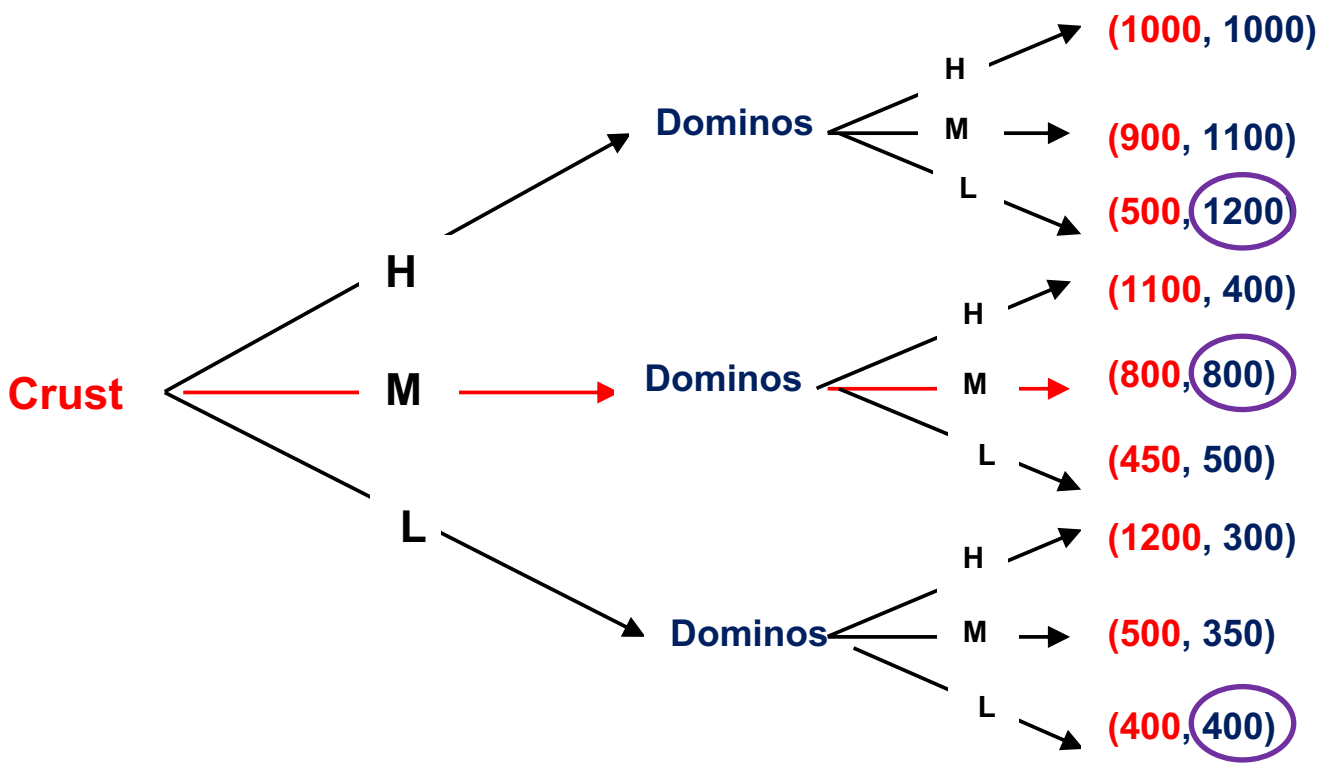
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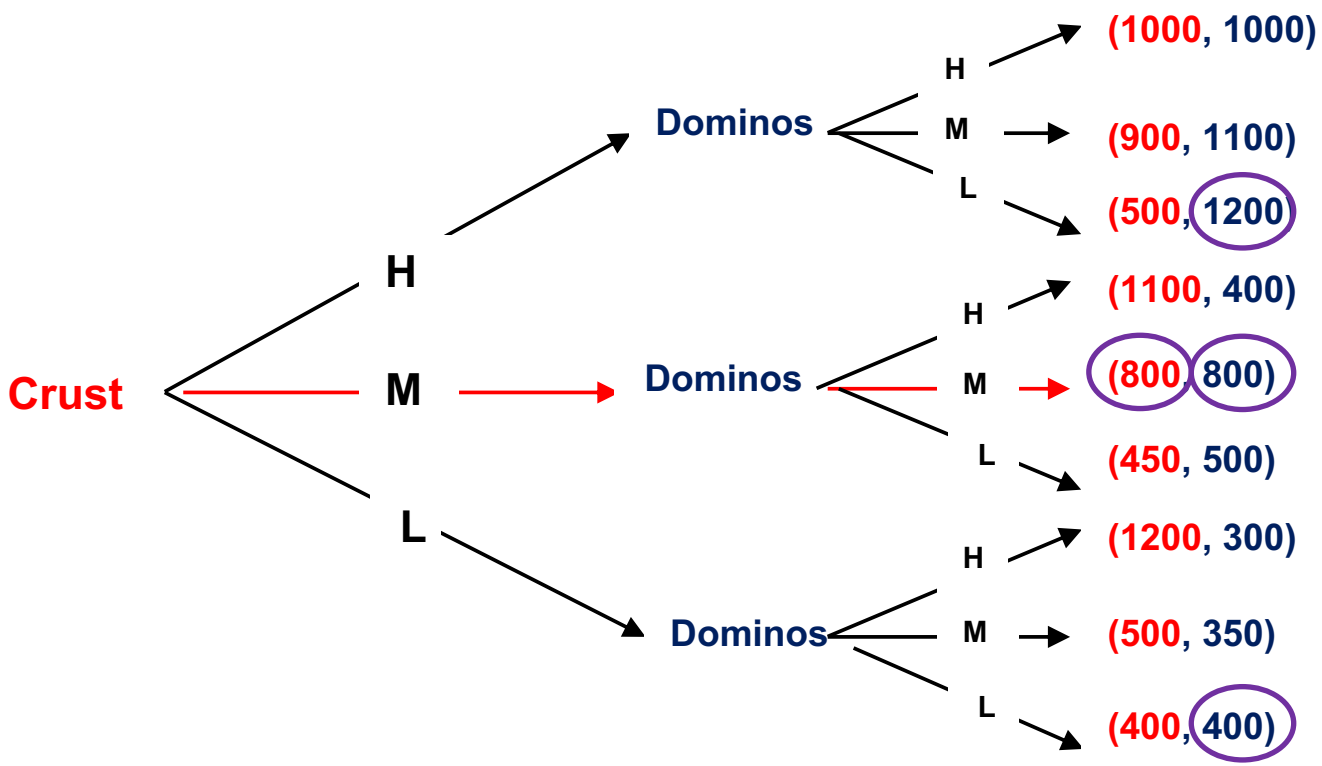
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QUESTION 6

Firm

Customer

	Low quality	High Quality
Don't buy	$0, $0	$0, -$10
Buy	-$10, $10	$1, $1

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QUESTION 6

Payoff from selling low quality product:

$$Payoff = 10$$

Payoff from continually selling high-quality product.

$$Payoff = 1+1+1+1+\ldots.$$

Net present value of selling high-quality product is:

$$1 + \frac{1}{(1+r)} + \frac{1}{(1+r)^2} + \frac{1}{(1+r)^3} + \cdots$$

QUESTION 7

Offer: $3000

If seller accepts: value must be between $1000 and $3000.

If value evenly distributed across that interval, its average value would be $2000.

Given it is worth 1.33 times more to you, it would be worth $2,667.

You would lose, on average, $333.

QUESTION 7

Offer: $*B*

If seller accepts: value must be between $1000 and $*B* (i.e. [1000, *B*]).

If value evenly distributed across that interval, its average value would be:

$$\$1000 + \frac{B - 1000}{2} = 500 + \frac{B}{2}$$

So the expected value of the car to you will be:

$$\left(\frac{4}{3}\right)\left(500 + \frac{B}{2}\right)$$

To ensure you don't lose you want:

$$\left(\frac{4}{3}\right)\left(500 + \frac{B}{2}\right) > B$$

Solve this out: *B<$2000*

QUESTION 8

Consider two employees assigned to a team, Anna and Bert. Anna and Bert can work or shirk.

Payoffs reflecting the utility from exerting effort, along with the disutility of effort.

		Bert	
		Shirk	Work
Anna	Shirk	$1000, $1000	$3000, $0
	Work	$0, $3000	$2000, $2000

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QUESTION 8

Anna and Bert can work or shirk. Solution is that they both shirk. This is another version of the prisoner's dilemma.

		Bert	
		Shirk	Work
Anna	Shirk	$1000, $1000	$3000, $0
	Work	$0, $3000	$2000, $2000

QUESTION 8

Now suppose you expect to continue to work together into the future.

To formalise this, suppose you expect to work on the same team again with probability p, so probability working together for n periods is $p^{(n-1)}$.

To keep life easy we will consider that Anna and Bert have only two strategies available to them:

- Always shirk in which case the payoff is:

$$E(\text{future earnings}) = \$1{,}000 + \$1{,}000p + \$1{,}000p^2 + \ldots = \frac{1000}{1-p}$$

- Work hard first period then if they ever shirk, punish them forever by always shirking in the future (grim trigger strategy).

QUESTION 8

Anna and Bert can work or shirk. What if they each think the other will play grim trigger?

		Bert	
		Always Shirk	**Work then grim trigger**
Anna	**Always Shirk**	$1000/(1-p), $1000/(1-p)	$2000+$1000/(1-p), -$1000 +$1000/(1-p)
	Work then grim trigger	-$1000 +$1000/(1-p), $2000+$1000/(1-p)	$2000/(1-p), $2000/(1-p)

QUESTION 8

But what if Anna thinks Bert will go grim trigger, may be in her interest to do so. In fact she will do so as long as p>0.5. That is:

$$\frac{2000}{1-p} > 2000 + \frac{1000}{1-p}$$

$$\frac{2000 - 2000 + 2000p}{1-p} > \frac{1000}{1-p}$$

$$p > 0.5$$

QUESTION 8

If p=1/3, shirking.

		Bert	
		Shirk	Work then grim trigger
Anna	Shirk	$1500, $1500	$3500, $500
	Work then grim trigger	$500, $3500	$3000, $3000

QUESTION 8

If p=3/4, two Nash equilibria. Initial expectations matter. What should a firm do …?

		Bert	
		Shirk	Work then grim trigger
Anna	Shirk	$4000, $4000	$6000, $3000
	Work then grim trigger	$3000, $6000	$8000, $8000