Quiz #1D

Please complete the following quiz. Read all instructions carefully and answer each question asked. Calculations and notation are important but so are explanations and dialogue.

1. Of patients entering the emergency room, half have a nasty bacterium and half do not. A test is administered to all patients and the results given below. A patient could test either positive or negative. The following joint probability table was created based on hospital research.

Condit

$p(T+|HB) = \frac{P(T+ \& HB)}{P(HB)} = \frac{43\%}{50\%} = 86\%$

	Test +	Test -	Totals
Has Bacterium	43%	7%	50%
Does Not Have Bacterium	4%	46%	50%
	47%	53%	100%

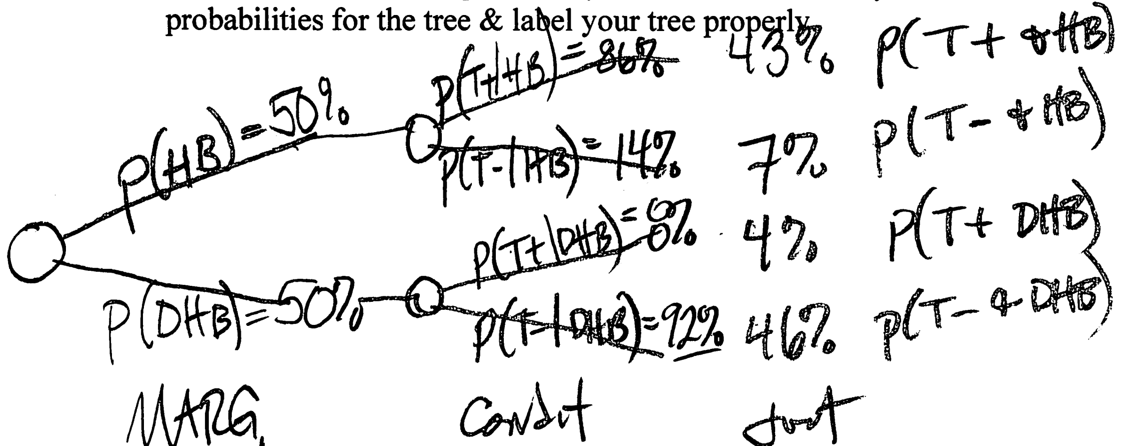
$p(T-|HB) = 1 - 86\% = 14\%$

a. From this data create a probability tree. HINT: Use Bayes' Rule to find the conditional probabilities for the tree & label your tree properly.

Condit

$P(T+|DHB) = \frac{P(T+ \& DHB)}{P(DHB)} = \frac{4\%}{50\%} = 8\%$

$P(T-|DHB) = 1 - 8\% = 92\%$



b. From the joint probability table and your probability tree, determine the following probabilities:

1) What is the probability of testing negative given that the patient did have the bacteria? (This is called a false negative)
2) What is the probability of testing positive given that the patient did not have the bacteria? (This is called a false positive)
3) What percentage of patients are properly diagnosed? (i.e., those who have the bacterium AND test positive and those who are do not have the bacterium AND test negative.)

b1) $p(T-|HB) = \frac{P(T- \& HB)}{p(HB)} = \frac{7\%}{50\%} = 14\%$ (Calculated Earlier)

About 14% of the time given a person has the bacteria they will test −

b2) $P(T+|DHB) = \frac{P(T+ \& DHB)}{P(DHB)} = \frac{4\%}{50\%} = 8\%$ (Calculated Earlier)

About 8% of the time given a person does not have bacteria they will test +

b3) $P(T+ \& HB) + P(T- \& DHB) = 43\% + 46\% = 89\%$

∴ 89% of the time people are diagnosed properly

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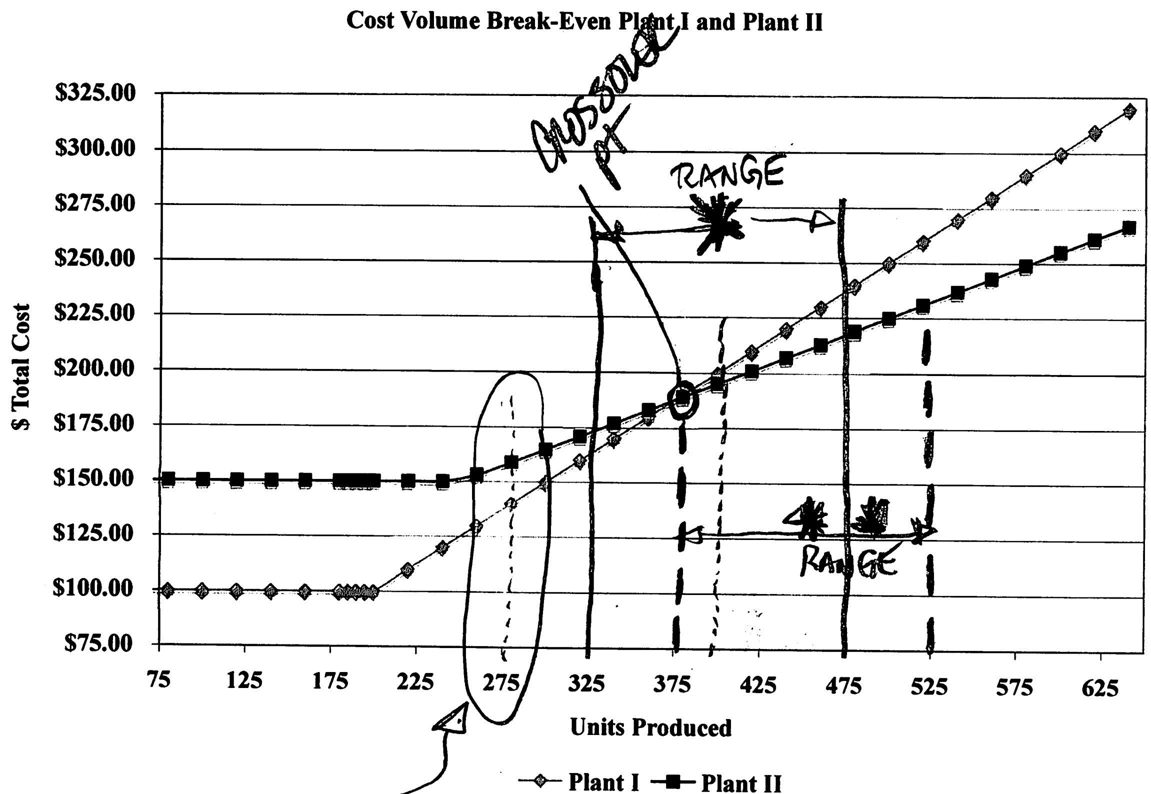
2. Given the following cost-volume break-even graph discuss the following:



a. Jimmy's boss wants to know which plant to buy from if they plan on using around 275 units on average. What plant would you recommend to Jimmy and his boss? Explain why you chose your answer.

The lowest cost PLANT IS PLANT 1 @ 275 units. WE CAN SEE this from the graph.

b. Jimmy's boss now informs him the number of units they plan on using has changed and it could be as high as 475 or as low as 325. What plant should Jimmy suggest the company buy from? Explain why you chose your answer.

* NOW WE ARE LOOKING @ A RANGE from 325 to 475. THE CROSSOVER pt. LIES A BIT to the left of the RANGE mid pt.
∴ PLANT II WOULD BE A LOWER cost PLANT ON AVERAGE.

c. Jimmy believes they will really use 375 to 525. What do you recommend to Jimmy now? Explain why you chose your answer.

** IN THIS CASE PLANT II IS the LOWER Cost PLAN OVER the ENTIRE Range 375 to 525.
∴ CHOOSE PLANT II.

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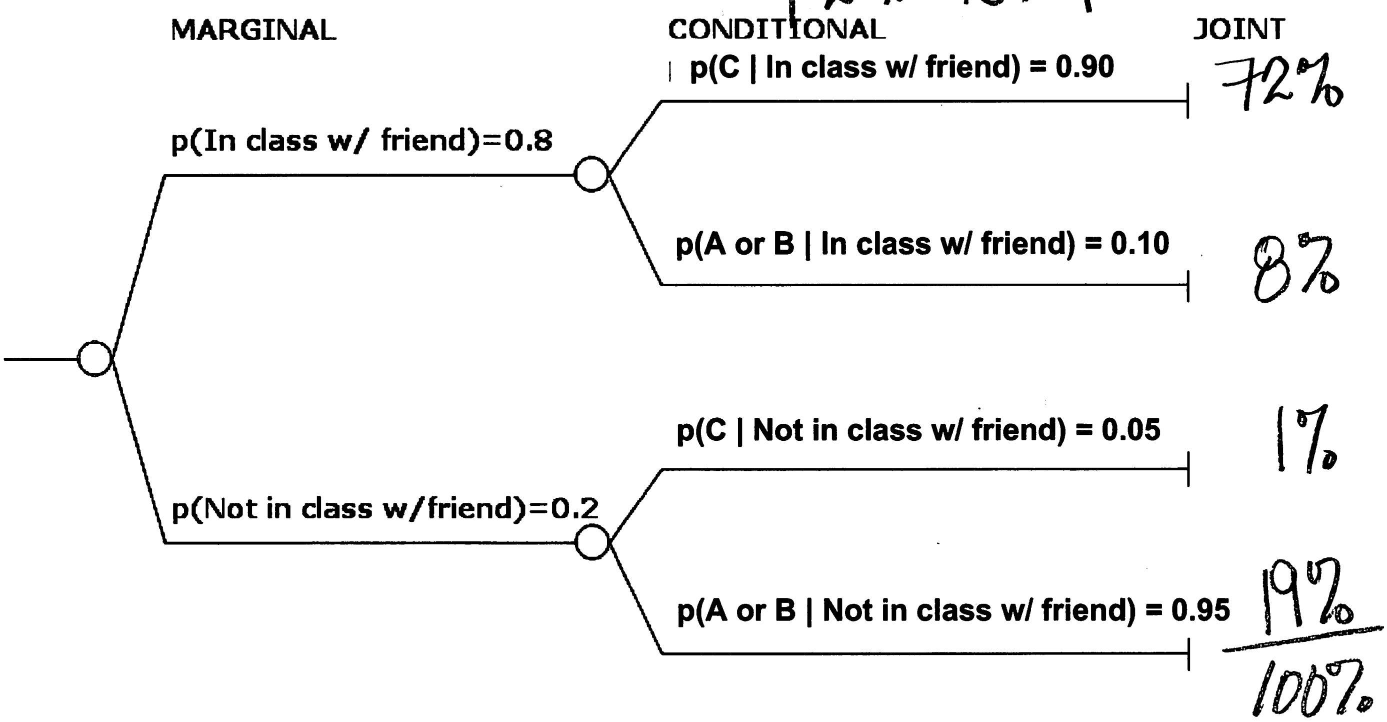
Please complete the following quiz. Read all instructions carefully and answer each question asked. Calculations and notation are important but so are explanations and dialogue.

3. Jane knows that there is an 80% chance she will be in class with her best friend and a 20% chance that she will not be in class with her best friend. Given that she is in class with her best friend there is a 90% chance she will only get a C in the course. Likewise, given she is in class with her best friend there is a 10% chance she will get an A or B in the course. On the other hand, given she is not in class with her best friend there is an 95% chance that she will receive an A or B in the course. Likewise, given she is not in class with her best friend, there is a 5% chance she will receive a C in the course.

   a. From this data, finish the probability tree

   b. Create a joint probability table.

	AorB	C	
IC	8%	72%	80%
NIC	19%	1%	20%
	27%	73%	



   c. From your joint probability table, determine the following probabilities:

      1) The probability of Jane receiving a C grade AND not being in class with her best friend?
      2) The probability of being in class with her best friend given that she received an A or B?
      3) What percentage of the time does Jane receive an A or B?

1) $p(C \,\&\, NIC) = 1\%$ FROM JOINT PROB TABLE, SO ABOUT 1% SHE RECEIVES A C & IS NOT IN CLASS W/ HER FRIEND

2) USE BAYES $p(IC|AorB) = \frac{P(IC \,\&\, AorB)}{P(AorB)} = \frac{8\%}{27\%} \approx 29.62$ $\therefore$ GIVEN SHE RECEIVES AN AorB THERE IS ABOUT A 29% to 30% CHANCE OF BEING IN CLASS W/ HER FRIEND

3) $p(AorB) = 27\%$ FROM JOINT PROB TABLE $\therefore$ ABOUT 27% of the TIME SHE RECEIVES AN AorB.