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Questions

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Question 1

```
        S Q T
 (+)    S Q T
 ------------
      P Q R S
```

The problem asks to replace each letter with a number between 0 to 9 so that the addition is correct. For example, S=6, Q=2, T=3, R=4 and P=1 gives 623+623 = 1246. For solving the problem correctly, you might need to consider extra variables.

a) State the variables of the problem. **[1]**

b) State the domains of the problem. **[1]**

c) State the constraints of the problem. **[3]**

Question 2

a) A factory produces bolts using two machines A and B. The probability of A machine producing a faulty bolt is 95% while for B machine it is 98%. Both A and B machines produce 6% of faulty bolts. If a faulty bolt is produced on a particular day then which machine is more likely to be responsible for it? **[4.5]**

	Likes Marvel		Doesn't like Marvel	
	Likes DC	Doesn't like DC	Likes DC	Doesn't Like DC
Male	0.63	0.32	0.43	0.10
Female	0.28	0.49	0.35	0.05

b) Based on the information given in the table answer the following questions. **[3]**

  i) Is not liking DC conditionally independent of Male given he likes Marvel? Please explain

  ii) Find the value of P(Female ^ likes DC | Doesn't like Marvel)

Question 3

a) From the table below, find out the probability of going to university if the weather is cloudy, only a few of your friends will go as and you have 3 classes. **[4.5]**

Class No.	Friends	Weather	Go to uni
2	Most	Sunny	Yes
2	Few	Cloudy	Yes
3	Most	Raining	Yes
3	Few	Cloudy	No
3	Few	Sunny	Yes
2	Most	Sunny	No
2	Most	Raining	No
3	Few	Sunny	Yes

b) What problem would you have to face if you used basic bayes' rule to solve problem (a). Please explain. **[0.5]**

Question 4

a) What is a zero-sum game? **[1]**

b) Is poker a perfect information game? **[1.5]**

Question 5

Suppose a genetic algorithm uses chromosomes with a fixed length of eight genes. Each gene can be any digit between 0 and 9. We need to maximize the number of odd numbers in the chromosome. Consider the following 4 individuals:

X1 = 52235693

X2 = 34796721

X3 = 46378921

X4 = 28023871

Compute fitness function for each individual. Arrange them in an order to highest to least fit. Perform crossover of fittest individuals at middle point. Recompute fitness functions. **[5]**

Submission Link

Answer the questions in your script and scan it into a PDF file (You can use camscanner or simply make PDF with screenshots). Once you are done,

rename the file as **YourSection_YourName_YourID**. For example if a guy from section 4 named Peter Parker has a ID of 14101061, his filename should be **4_Peter Parker_14101061**

Then, submit the PDF file in the follwing link. Make sure that all the information you provide in the form are correct. **You get only once chance to submit. Therefore, double check everything before clicking the submit button.**

https://forms.gle/QwWh5vtVfh9JAHaj7

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