

Write the argument below in symbolic form, and then use known logical equivalences and inference rules to show it is valid. Remember to define the letters you use to represent statements.

The statement that I am wearing socks or I play with my puppy is false

I either play with my puppy or watch Jeopardy

If I don't go running, then I don't watch Jeopardy

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$\therefore$  I go running

2- Alice, Bob, Camilla and Dan are making plans for spring break. They go to the travel agency, but there are only 2 tickets left. Alice will only go if Bob goes too. Dan will only go if Camilla goes too. Bob has found out that he has to work on the AI project, so he cannot go.

(a) Using 4 literals, write the propositional logic formulas corresponding to this text

(b) Alice will go only if Bob goes:

(c) Dan goes only if Camilla goes:

(d) Bob cannot go:

3-A genetic algorithm is to be used to evolve a binary string of length  $n$  containing only 1s. The initial population is a randomly generated set of binary strings of length  $n$ .

a. Give a suitable fitness function for this problem.

b. Will the offspring of parents with a high fitness value generally also have a high fitness value, given your fitness function? Explain your answer

c- Suppose the problem is to evolve a binary string of length  $n$  which is symmetric. If the string positions are numbered from 0, then a symmetric string will have a 1 in position  $i$  if and only if there is a 1 in position  $(n - 1) - i$ . For example, 001100 is symmetric since it has a 1 at index 2 and a 1 at index  $(6 - 1) - 2 = 3$ . Similarly, 110011 is symmetric, and 011011 is not. The initial population is a randomly generated set of binary strings of length  $n$ , where  $n$  is an even number.

Give a suitable fitness function for this problem.