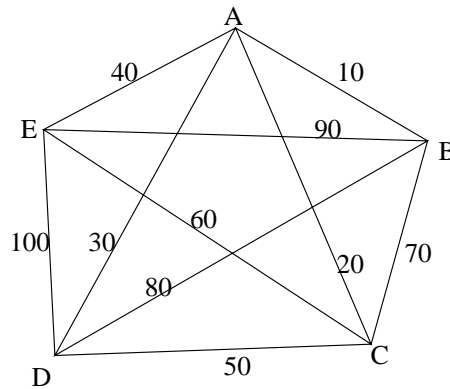


A Series of Graph Theory Related Puzzles; Try to use graph theory to solve them

1. You and your partner attend a party with 3 other couples. Several handshakes take place; no one with themselves or their partner. Each of the other people shook a different number of hands. How many hands did you shake? How many did your husband shake?
2. What is the least cost path that takes you to each city at least once in the network below? What is the cost?



3. In a party of at least 6 people, prove that there is either a group of three people who each know each other, or a group of three people who do not know each other (or both).
4. Three couples must get to town, but they only have a two-seater to take them there. How can they get all 6 people to town with the restriction that no woman can be left with a man that is not her husband unless her husband is present?
5. We want to divide an 8 ounce bottle of water into two equal amounts, but we only have empty 5 and 3 ounce bottles to do it with. How can we divide the water in the least number of pourings?
6. Eight spies (code names: A,B,C,D,E,F,G,H) must set up a communication network of the lowest possible risk. Given the risk factors for the available communications, determine the network so each spy can communicate with each other spy.

Agent	A	A	A	A	A	B	B	C	C	C	C	D	D	E
Pairs	B	C	E	F	G	C	F	D	F	G	H	E	H	H
Risk	9	3	8	3	4	10	6	6	4	5	7	6	3	5

7. Suppose in a gathering of GSS students there are an equal number of boys and video games, and suppose that each boy has played a certain number of the games (but not necessarily all of them). Under what conditions is it possible for all the boys to be playing video games at the same time while each is playing a game that they had played before? (Looking for minimal, not trivial solutions)