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arp257

1)
providers either good or bad,
p(negative experience) given provider is bad=.95
p(negative experience) given provider is good=.01

a)
providers are good, eg .005 are bad
p(b) given negative experience
p(bad|neg)=p(neg|bad)p(bad)/(p(neg|bad)p(bad)+p(neg|good)p(good)
=.95*.005/(.95*.005+.01*.995)
=.323=32.3%
if there is a second review that is bad, then that is the same as the probability that it is bad from the first review OR the probability that it is bad from the second review. This equals
P(bad|neg) || p(bad||neg)=p(bad|neg)+p(bad|neg)=2*32.3%
=64.6%

b)
providers are good, .7 are bad
p(bad|neg)=.95*.7/(.95*.7+.01*.3)
=.955=95.5%

2)
a)
1) disagree that they must, converse is not always true (if a->b then not necessarily b->a)
2) agree, contrapositive is always true, if a->b then !b->!a
3) disagree, inverse is not always true, if a->b then not necessarily !a->!b

b)
1) david active, jessica not active; kim good scores, ethan not;
   a) if you ask david if he got a good grade, and if he did, then that will confirm the study (a->b)
   b) if you ask ethan if he participated and he didn't, then that would also confirm the study (!b->!a)
   c) if you ask kim if she participated and she did, then that would also confirm the story (a->b)
   d) jessica's grades will neither confirm or deny the study (!a does not lead to anything)

3)

a) neither dominates the other, as b is more likeable but g has more convenience so neither is at least as good as the other on both counts
b) G dominates F because 3>2 and 4>=4, dominates A because 3>1 and 3>=1,however G is not pareto-optimal because it is dominated by C (3<4 and 4<8)
c) no it is not pareto-optimal because it is dominated by C(4<=4 and 8>3), however it pareto-dominates A (4>1 and 3>=2)
d) no because there is no restaurant that is at least as good as all the others in both categories, and so there can be no optimal restaurant

4) talked to Mike Merrill and Emmett Kotlikoff about this problem

a)

proof by counterexample:

take the example graph below

a->d

b->d

c->d

the set {a,b} and the set {b,c} are both constricted sets, however, the intersection is the set {b}. |N({b})|=1 and |{b}|=1. 1 !>1 so the intersection of two constricted sets is not always a constricted set

b)

1) An augmented path alternates between nodes that are in the matching and not in the matching. Because we cannot end the path at a matched node, there has to be an unmatched node after. And since the path always starts with an unmatched node, the path must always be of the form unmatched, (matched, unmatched), (unmatched,matched), which has length 1+2(number of sets of matched and unmatched nodes), which is always an even number
2) Neither is true because the path can start with an unmatched or a matched node, which means that it could have an odd or even length.