

### Solutions to Real Quiz 3

**NAME:** (print!) Dr. Z.

**1.** (8 points) Prove that in any gathering of six people, there are either three people who all know each other, or three people none of whom knows either of the other ones.

**Sol. of 1:** Pick any of the guests, let's call him Joe.

Case I: Joe knows at least three of the other guests

Case II: Joe doesn't know at least three of the other guests

(You can't have both of them be wrong since otherwise the total number of other guests would be at most 4)

Case Ia: None of the (at least) three guests whom Joe knows know each other, we are done! We got three people who do not know each other.

Case Ib: Among the people that Joe knows, there is at least one pair who know each other. Then together with Joe we have three people who know each other. We are done again!

Case IIa and IIb are exactly similar, just exchange 'know' and 'doesn't know'.