

MATHEMATICS ENRICHMENT CLUB.

Problem Sheet 14, August 26, 2014 <sup>1</sup>

1. Two tennis players, A and B are equally strong (have a 50/50 probability of beating the other). Is it more likely for A to beat B in 3 sets out of 4, or in 5 sets out of 8?
2. Scissors, paper, rock is a balanced game. Two players each choose one of the options, scissors, paper or rock, at the same time. The winner is determined using the rules rock beats scissors, scissors beats paper and paper beats rock. All other combinations are draws. By balanced we mean that each option has an equal chance of winning. Show that adding an extra option necessarily makes the game unbalanced (one option will win more often, or with higher probability, than the others).
3. (a) Let  $a$  and  $b$  be integers, and  $p$  an odd prime which divides both  $a + b$  and  $a^2 + b^2$ .

(a) There are 3 possible routes ABD , ABCD and ACD