Theory Club
Fall 2016
Problem Session
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This problem set contains 4 pages (including this cover page) and 3 problems.

Problem	Points	Score
1	10	
2	10	
3	999	
Total:	1019	

1. (10 points) Prove that among $2n$ people, there are two who have an even number (including 0) of friends in common.

2. (10 points) How many balanced strings of parentheses of length n can be constructed? For example, a valid string is (()((()))).

3. (999 points) You want to leave a message (in binary) on a classroom whiteboard for your friend. However, parts of your message will be erased during the classes in between.

   For example, you write: "01010111" and your friend sees "0_1__0111".

   How can you make sure your friend can recover your m bit message given that $\leq k$ bits will be erased?

   Can you place a lower bound on the number of additional bits, n, as a function of k?