

**18.S997 (FALL 2017) PROBLEM SET 3**

1. Fix  $0 < p < 1$ . Let  $G$  be a graph on  $n$  vertices with average degree at least  $pn$ . Prove:
- (a) The number of labeled 6-cycles in  $G$  is at least  $(p^6 - o(1))n^6$ .
  - (b) The number of labeled copies of  $K_{3,3}$  in  $G$  is at least  $(p^9 - o(1))n^6$ .
  - (c) The number of labeled copies of  $Q_3 = \square$  in  $G$  is at least  $(p^{12} - o(1))n^8$ .
  - (d) (Bonus) The number of labeled paths on 4 vertices in  $G$  is at least  $(p^3 - o(1))n^4$ .

*... to be continued ... check back later (last updated: October 17, 2017)*