

Honors Combinatorics CS-284/Math-274 Second Quiz. May 21, 2008  
Instructor: László Babai

Name: \_\_\_\_\_

Show all your work. **Do not use book, notes, or scrap paper.** Write your answers in the space provided. You may continue on the reverse. Warning: the bonus problem is underrated; solve the regular problem first. – This quiz contributes 4% to your course grade.

1. (12 points) Prove:  $n \not\rightarrow (k, k)$ , where  $k = \lceil 1 + 2 \log_2 n \rceil$ .
2. (BONUS: 4 points) Prove:  $\text{ex}(n, K_{2,3}) = O(n^{3/2})$ . In other words, prove that if a graph  $G$  with  $n$  vertices does not contain  $K_{2,3}$  then it has  $O(n^{3/2})$  edges.