

## Graphentheorie

1. Übungsblatt WS 05/06

Abgabetermin: 31.10.05

### Exercise 1

Let  $n$  be a given positive integer, and let  $r$  and  $s$  be nonnegative integers such that  $r + s = n$  and  $s$  is even. Show that there exists a graph  $G$  of order  $n$  having  $r$  even vertices and  $s$  odd vertices.

### Exercise 2

A nontrivial graph  $G$  is called irregular if no two vertices of  $G$  have the same degree. Prove that no graph is irregular.

### Exercise 3

Show that the sequence  $d_1, d_2, \dots, d_n$  is graphical if and only if the sequence  $n - d_1 - 1, n - d_2 - 1, \dots, n - d_n - 1$  is graphical.

### Exercise 4

Prove that if  $G$  is a graph with  $\delta(G) \geq 2$ , then  $G$  contains a cycle.

### Exercise 5

Prove that every graph  $G$  has a path of length  $\delta(G)$ .