Prof. Dr. Gabor Galambos
Dr. Marcus Oswald
Institut für Informatik
Universität Heidelberg

Graphentheorie

7. Übungsblatt WS 05/06
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Exercise 32

Let $G(n, m)$ be a bipartite planar graph. Prove that $m \leq 2n - 4$.

Exercise 33

Let $G(n, m)$ be a bipartite planar graph. Prove that G contains a vertex of degree at most 3.

Exercise 34

A mouse eats its way through a $3 \times 3 \times 3$ cube of cheese by tunnelling through all of the 27 $1 \times 1 \times 1$ subcubes. If it starts at one corner and always moves on to an uneaten subcube, can it finish at the centre of the cube?

Exercise 35

Show that it is impossible, using 1×2 rectangles, to exactly cover an 8×8 square from which two opposite 1×1 corner squares have been removed.

Exercise 36

Let $d_1 \leq d_2 \leq \ldots \leq d_n$ be a degree sequence of a planar graph. By making use of an upper bound for $\sum d_i$, show that if $d_1 \geq 4$ then

$$\sum_{i=1}^{n} d_i^2 < 2(n+3)^2 - 62$$