General Mathematics and ACM II

Exercise 3

February 11, 2011

1. Let G be a finite connected planar graph with V its set of vertices, E its set of edges, and F its set of faces.

   (a) Show that $2\,|E| \geq 3\,|F|$.

   (b) Show that $|E| \leq 3\,|V| - 6$.

   (c) Conclude that every planar graph must have at least one vertex of valency less than 6.

2. A standard deck of cards is dealt into 13 piles of 4 cards each. Show that you can always choose exactly one card from each of the 13 piles as to obtain exactly one card of each rank, i.e., each of 2, 3, 4, ..., King, Ace.

3. Ivanov, p. 99, Problem 13.

   (This problem will be discussed in class on Wednesday again, so you may choose to hand it in on Friday.)