

Quiz: Friday, March 25th (in class)

## Reading

For Friday, March 18th, Section 11.5.  
For Wednesday, March 23rd, Section 11.6.  
For Friday, March 25th, Section 12.1.

## Assignment questions

Section 11.3: 6, 20, 28.  
Section 11.4: 7, 14, 22.

### Instructor questions:

1. Prove that if  $G$  is a simple planar graph with  $v \geq 3$  vertices and  $e$  edges and no cycle of length 3, then  $e \leq 2v - 4$ .
2. Prove that if  $G$  is a simple planar graph with  $v \geq 4$  vertices and  $e$  edges and no cycle of length 4 or less, then  $e \leq (5/3)v - (10/3)$ .
3. Which of the non planar graphs have the property that, for any vertex  $v$ , removing  $v$  and all edges incident to  $v$  results in a planar graph: a)  $K_5$ , b)  $K_6$ , c)  $K_{3,3}$ , d)  $K_{3,4}$ .
4. The *crossing number* of a simple graph is the minimum number of edges crossings that can occur when that graph is drawn on the plane where no three edges are permitted to cross at the same point. Prove that  $K_{3,3}$  has crossing number 1 and  $K_6$  crossing number at most 3.

## Some other questions worth trying

Section 11.3: 1, 3, 5.  
Section 11.4: 3, 5.  
Section 11.5: 1.