MATH 4473, Seminar - Discrete Mathematical Structures
Quiz 3, Spring 2010

This is a closed book, closed note test, and should be your work only. Calculators are permitted.

1. Determine if the following graph is planar. If it is not planar, explain. If it is planar, draw it so that no edges cross. (Thanks to Isaiah!)

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This graph has a homeomorphic copy of $K_{3,3}$ hidden in it, so is not planar.
Remove $i$ and the 3 edges incident to $i$ as well as the edge between $a$ and $c$
Voilà!
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2. Find the chromatic number of the following graph.

3. Suppose that a connected planar graph has six vertices, each of degree four. Into how many regions is the plane divided by a planar representation of this graph?

\[
V = 6, \quad \text{degree} = 4, \quad \text{so} \quad \frac{2d}{2} = 12 \quad \text{edges}
\]

\[
r = e - V + 2 = 12 - 6 + 2 = 8 \quad \text{regions}
\]