Name: .....

1. Find $\chi'(G)$, the **edge** chromatic number of the graph G in Figure 1.

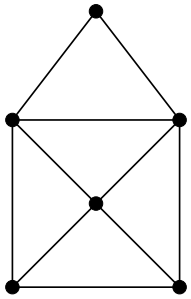

Figure 1

2. Consider the graph G in Figure 2 and the red matching M in G. Using the Hungarian method, find an augmenting path in G with respect to M, and augment M along it.

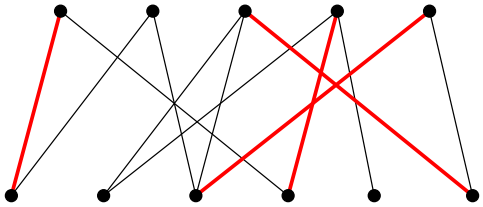

Figure 2

3. Let G be the following graph: The vertices of G are the numbers $1, 2, 3, 4, 5, 6, 7, 8$ and two different vertices (numbers) i and j are adjacent in G if and only if one is divisible by the other (i.e. if $i|j$ or $j|i$). Determine the chromatic number of G.

4. Prove that every d-regular bipartite multigraph contains a perfect matching, if $d \geq 1$.

Justify your answers!