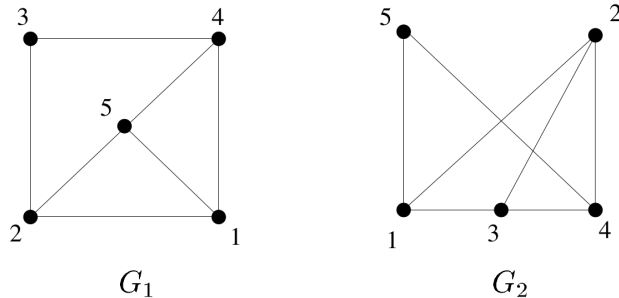GRAPHS AND NETWORKS (MATH20150)

Problem sheet 7

1. Show that the graphs $G_1 = (V_1, E_1)$ and $G_2 = (V_2, E_2)$ below are isomorphic

G_1 $\qquad\qquad$ G_2

2. A postman in a village picks mail at the post office, delivers it, then returns to the post office. He must cover each street in the village at least once. Of course he wishes to take a route that is the shortest possible. This is called the Chinese postman problem (because it was first considered in these terms by a Chinese mathematician, Kuan, in 1962). Let G be the graph corresponding the streets of the village (the intersections of the streets are the vertices, the streets between the intersections are the edges). Show that if G is Eulerian, then the Chinese postman problem has a solution.

3. Let G and H be two isomorphic graphs, with G bipartite. Show that H is bipartite.

4. Are the following two graphs isomorphic?
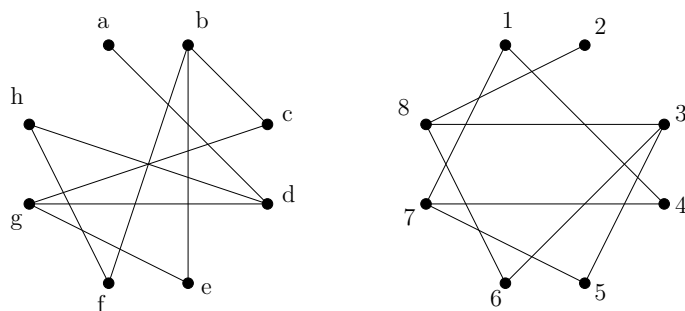
5. (Optional) Draw K_5 on a torus (=a donut) without intersecting any edges. (We will see in class that K_5 is not planar, so you cannot do this in the plane.)

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