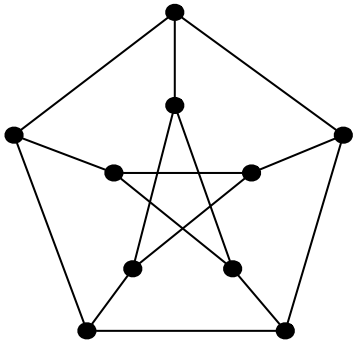
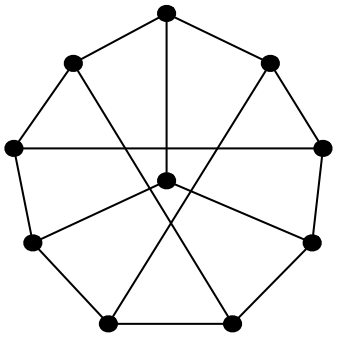
▶ **Problem 9.3-6**

Determine whether the two graphs pictured in the following are isomorphic. (The one on the left is the Petersen graph)

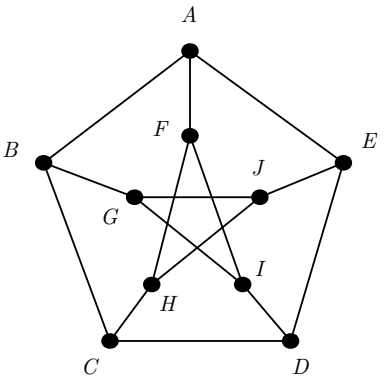


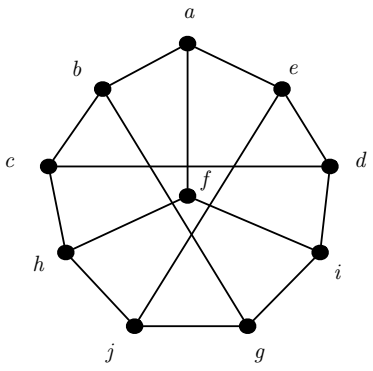


Solution. Let $G_1 = (V_1, E_1)$ be the graph on the left side and $G_2 = (V_2, E_2)$ be the graph on the right side, respectively. By definition 9.3.1, to show that $G_1 \cong G_2$, we need to provide a one-to-one function φ from V_1 onto V_2 such that

- if $uv \in E_1$, then $\varphi(u)\varphi(v) \in E_2$;
- if $uv \in E_2$, then $\varphi^{-1}(u)\varphi^{-1}(v) \in E_1$.

Thus, we give the the following mapping: $\varphi(A) = a$, $\varphi(B) = b$, $\varphi(C) = c$, $\varphi(D) = d$, $\varphi(E) = e$, $\varphi(F) = f$, $\varphi(G) = g$, $\varphi(H) = h$, $\varphi(I) = i$, $\varphi(J) = j$ as shown in the figure to show the isomorphism.





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