

1. A graph is called *k-regular* if the degree of each vertex is k .
 - a. Find a 4-regular simple graph with 8 vertices.
 - b. Find a 5-regular simple graph with 8 vertices.
 - c. Show that there is a k -regular simple graph with n vertices if and only if kn is even and $k < n$.

Recall that $K_{n,m}$ is the complete bipartite graph and P_n is the path with n vertices.

2. Given the graphs G and H , the Ramsey number $R(G, H)$ is the minimum number such that every red-green coloring of the edges of $K_{R(G,H)}$ contains a red G or a green H .
 - a. Show that the Ramsey number $R(K_{1,m}, K_{1,m})$ is $2m$ if m is odd and $2m - 1$ if m is even.
 - b. Find the Ramsey number $R(P_3, P_3)$.
3. Show that $R(3, 5) = 14$.