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Energy of Graphs

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The *energy* of a graph is defined as the sum of the absolute values of all eigenvalues of a graph. Let G be a graph and the rank of its adjacency matrix denoted by $\text{rank}(G)$. In this paper we characterize all graphs whose $E(G) = \text{rank}(G)$. Let G be a graph of order n. We prove that $E(G) \geq \text{rank}(G)$ and the equality holds if and only if $G = \frac{r}{2}K_2 \cup (n-r)K_1$, for some positive integer r. For every connected bipartite graph G of rank r it is shown that $E(G) \geq \sqrt{(r+1)^2 - 5}$. A graph G of order n is called *hyperenergetic* if $E(G) > 2n - 2$, where $E(G)$ is the energy of G. In this paper we prove that the Kneser graph $K_{n:r}$ is hyperenergetic for any natural numbers n and $r \geq 2$ with $n \geq 2r + 1$. Also we prove that for $r \geq 2$, the complement of Kneser graph, $E(\overline{K_{n:r}})$, is hyperenergetic.