PROBLEMS FOR SOLUTION

P40. (Conjecture). If the edges of a convex polyhedron form a "cage" surrounding a sphere of unit radius, then these edges have a total length of at least $9\sqrt{3}$ (see Math. Rev. 20 (1959), Rev. 1950).

H. S. M. Coxeter

P41. Let P_1, P_2, P_3, P_4 be any four points in the plane, no three collinear. On P_iP_{i+1} construct a square with centre Q_i so that the triangles $Q_iP_iP_{i+1}$ all have the same "orientation" ($i = 1, 2, 3, 4$; $P_5 = P_1$). Show that the segments Q_1Q_3 and Q_2Q_4 have the same lengths, and the lines containing them are perpendicular.

W. A. J. Luxemburg

P42. Let $q_n = 1 + \Sigma_{r=1}^{n} \phi(r)$ where ϕ denotes the Euler totient function and let p_n be the n-th prime ($p_1 = 2$). Prove that $p_n = q_n$ for $n = 1, 2, 3, 4, 5, 6$ but for no other values of n.

L. Moser

P43. Let G be a group generated by P and Q, and let H be the cyclic subgroup generated by P. If P and Q satisfy only the relations $P^2PQ = Q^2$ and $Q^2PQ^{-4} = P^k$ for some k, then the index of H in G is 14.

N. S. Mendelsohn

SOLUTIONS

P7. Define f(n) by $n^{f(n)} \| n!$, i.e., $n^{f(n)} | n!$ and $n^{f(n)+1} \nmid n!$