1. Find the smallest natural number n which has the following properties:

   (a) Its decimal representation has 6 as the last digit.

   (b) If the last digit 6 is erased and placed in front of he remaining digits, the resulting number is four times as large as the original number n.

2. Determine all real numbers x which satisfy the inequality:

$$\sqrt{3-x} - \sqrt{x+1} > \frac{1}{2} \tag{1}$$

3. consider the cube $ABCDA'B'C'D'(ABCDandA'B'C'D'$ are the upper and lower bases,respectively,and edges AA', BB', CC', DD' are parallel).The point X moves at constat speed along the perimeter of the square $ABCD$ in the direction $ABCDA$,and the point Y moves at the same rate along the perimeter of the square $B'C'CB$ in the direction $B'C'CBB'$.points X and Y begin their motion at the same instant from the starting positions $AandB'$, respectively. Determine and draw the locus of the midpoints of the segments XY.

4. solve the equation $\cos^2(x) + \cos^2(2x) + \cos^2(3x) = 1$

5. On the circle K there are given three distinct points A, B, C. Construct (using only straightedge and compasses) a fourth point D on K such that a circle can be inscribed in the quadrilateral thus obtained.

6. Consider an isosceles triangle. Let r be the radius of its circumscribed circle and ρ the radius of its inscribed circle. Prove that the distance d between the centers of these two circles is $d = \sqrt{r(r-2\rho)}$

7. The tetrahedron $SABC$ has the following property:there exist spheres,each tangent to the edges $SA, SB, SC, BCCA, AB$, or to their extensions.

(a) Prove that the tetrahedron $SABC$ is regular.

(b) Prove conversely that for every regular tetrahedron five such spheres exist.