1. A time is called *reflexive* if its representation on an analog clock would still be permissible if the hour and minute hand were switched. In a given non-leap day (12:00:00.00 a.m. to 11:59:59.99 p.m.), how many times are *reflexive*?

2. Find the sum of all positive integers N such that $s = \sqrt[3]{2+\sqrt{N}} + \sqrt[3]{2-\sqrt{N}}$ is also a positive integer.

3. A round robin tennis tournament is played among 4 friends in which each player plays every other player only one time, resulting in either a win or a loss for each player. If overall placement is determined strictly by how many games each player won, how many possible placements are there at the end of the tournament? For example, Andy and Bob tying for first and Charlie and Derek tying for third would be one possible case.

4. Find the sum of all real numbers x such that $x^2 = 5x + 6\sqrt{x} - 3$.

5. Circle C_1 has center O and radius OA, and circle C_2 has diameter OA. AB is a chord of circle C_1 and BD may be constructed with D on OA such that BD and OA are perpendicular. Let C be the point where C_2 and BD intersect. If $AC = 1$, find AB.

6. In a class of 30 students, each students knows exactly six other students. (Of course, knowing is a mutual relation, so if A knows B, then B knows A). A group of three students is balanced if either all three students know each other, or no one knows anyone else within that group. How many balanced groups exist?

7. Consider the infinite polynomial $G(x) = F_1x + F_2x^2 + F_3x^3 + \dots$ defined for $0 < x < \frac{\sqrt{5}-1}{2}$, where F_k is the kth term of the Fibonacci sequence defined to be $F_k = F_{k-1} + F_{k-2}$ with $F_1 = 1, F_2 = 1$. Determine the value a such that $G(a) = 2$.

8. A parabola has focus F and vertex V, where $VF = 10$. Let AB be a chord of length 100 that passes through F. Determine the area of $\triangle VAB$.

9. Sequences x_n and y_n satisfy the simultaneous relationships $x_k = x_{k+1} + y_{k+1}$ and $x_k > y_k$ for all $k \geq 1$. Furthermore, either $y_k = y_{k+1}$ or $y_k = x_{k+1}$. If $x_1 = 3 + \sqrt{2}$, $x_3 = 5 - \sqrt{2}$, and $y_1 = y_5$, evaluate
$$(y_1)^2 + (y_2)^2 + (y_3)^2 + \dots$$

10. In a far away kingdom, there exist k^2 cities subdivided into k distinct districts, such that in the i^{th} district, there exist $2i - 1$ cities. Each city is connected to every city in its district but no cities outside of its district. In order to improve transportation, the king wants to add $k - 1$ roads such that all cities will become connected, but his advisors tell him there are many ways to do this. Two plans are different if one road is in one plan that is not in the other. Find the total number of possible plans in terms of k.