1. Find \( a \) such that
\[
9 \left( a + \frac{1}{36a} \right)^2 - 6 \left( a + \frac{1}{36a} \right) + 1 = 0.
\]

2. The surface area of a cube is equal to the surface area of a sphere. What is the ratio of the volume of the cube to the volume of the sphere.

3. The cubes of two consecutive positive odd integers differ by 2402. What is the smaller of these two integers?

4. Find the area of the triangle formed by the lines \( x = 0 \), \( y = x \), and the line through the points \( \left(-\frac{1}{2}, \frac{3}{2}\right) \) and \( \left(\frac{1}{3}, \frac{2}{3}\right) \).

5. Find the largest real value \( a \) such that both roots of the polynomial \( x^2 + x + a \) are real and greater or equal than \( a \).

6. For the linear function \( f(x) = mx + b \), \( f(1) = -2 \) and \( f(-2) = 11 \). If for all \( x \), \( f(x+h) - f(x) = 6 \), then find \( h \).

7. What is the last digit of the number \( 2013^{2011} \)?

8. Square \( ABCD \) has side length 2. A semicircle with diameter \( AB \) is constructed inside the square, and the tangent to semicircle from \( C \) intersects side \( AD \) at \( E \). What is the length of \( CE \)?

9. The number \( 8^n \) is written on the blackboard. The sum of its digits is calculated, then the sum of the digits of the result is calculated and so on, until we get a single digit. What is this digit if \( n = 2013 \)?

10. Mark has three times as many nickels as quarters and three more dimes than nickels. If the total face value of these coins is $2.40, how many coins does Mark have?

11. What is the largest integer that is a divisor of \( (n+1)(n+3)(n+5)(n+7)(n+9) \) for all positive integers \( n \)?

12. A certain restaurant has a choice of 8 appetizers, 10 entrees and 6 deserts. If you plan to order an appetizer, an entree and a desert, how many different three-course meals are possible?

13. Let \( \{a_n\} \) be a sequence such that \( a_n = \frac{1}{\sqrt{n}} - \frac{1}{\sqrt{n+1}} \). Find \( a_1 + a_2 + \ldots + a_{63} \).
14. How many integers satisfy the following inequality
\[ \frac{x^4e^x}{x^2 - 4x - 21} < 0. \]

15. Find the area of the region on the xy-plane defined by the system of inequalities:
\[
\begin{cases}
    x^2 + y^2 & \leq 1 \\
    |x| + |y| & \geq 1 \\
    y & \geq 0
\end{cases}
\]

16. Find the least multiple of 7 which when divided by 2, 3, 4, 5, or 6 gives a reminder of 1.

17. If x and y satisfy the equations
\[
\begin{align*}
    6,751x + 3,249y &= 26,751 \\
    3,249x + 6,751y &= 23,249
\end{align*}
\]
then find \(x^2 - y^2\).

18. Given isosceles trapezoid \(ABCD\) and circle with diameter on BC (the smaller base) which is tangent to the base AD and passes through the middle points of the diagonals. What is the angle \(\hat{A}\)?

19. Solve the equation \(4 \cdot 9^{x-1} = 3\sqrt{2^{2x+1}}\)

20. Let \(f(x) = x^2 + 12x + 30\). Find the minimal \(x\) satisfying the equation \(f(f(f(f(f(x))))) = 0\).

21. For how many values of \(n\) will an \(n\) sided regular polygon have interior angles with integral degree measures?

22. Three semicircles of radius 1 are constructed on diameter \(\overline{AB}\) of a semicircle of radius 2. The centers of small semicircles divide \(\overline{AB}\) into four line segments of equal length, as shown. What is the area of the shaded region that lies within the large semicircle but outside the smaller semicircles?