1. Compute $\sqrt{1 + \sqrt{1 + \sqrt{1 + \sqrt{1 + \sqrt{1 + \ldots}}}}}$.

2. Write $2010.22012563$ modulo $2010.220$ as a fraction. You do not have to reduce the fraction.

3. Find $\sin 18^\circ$.

4. If $x^2 + \frac{1}{x^2} = 7$, find all possible values of $x^5 + \frac{1}{x^5}$.

5. Given two regions described by the inequalities $(x - 1)^2 + y^2 \leq 4$ and $(x + 1)^2 + y^2 \leq 4$, respectively, find the area of the intersection of the two regions.

6. Consider the sequence $1, 2, 1, 2, 2, 1, 2, 2, 2, 2, 2, 2, 2, 2, 1, \ldots$ Find $n$ such that the first $n$ terms sum up to $2010$.

7. Find all the integers $x$ in $[20, 50]$ such that $6x + 5 \equiv -19 \mod 10$, that is, $10$ divides $(6x + 15) + 19$.

8. Find all pairs of positive integers $(x, y)$ such that $2^x + 1 = 3^y$, and $y$ is not divisible by $4$.

9. Suppose $xy - 5x + 2y = 30$, where $x$ and $y$ are positive integers. Find the sum of all possible values of $x$.

10. Find the sum of all solutions of the equation

$$\frac{1}{x^2 - 1} + \frac{2}{x^2 - 2} + \frac{3}{x^2 - 3} + \frac{4}{x^2 - 4} = 2010x - 4.$$