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

2. Write $2010.220\overline{112563}$ modulo 2010.220 as a fraction. You do not have to reduce the fraction.

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

4. If $x^2 + 1/x^2 = 7$, find all possible values of $x^5 + 1/x^5$.

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 $1, 2, 1, 2, 2, 1, 2, 2, 2, 1, 2, 2, 2, 2, 1, \ldots$ 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

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