Time limit: 15 minutes.
Instructions: This tiebreaker contains 3 short answer questions. All answers must be expressed in simplest form unless specified otherwise. You will submit answers to the problem as you solve them, and may solve problems in any order. You will not be informed whether your answer is correct until the end of the tiebreaker. You may submit multiple times for any of the problems, but **only the last submission for a given problem will be graded**. The participant who correctly answers the most problems wins the tiebreaker, with ties broken by the time of the last correct submission.
No calculators.

1. Suppose $2+\cfrac{1}{5+\cfrac{1}{2+\cfrac{1}{5+\dots}}} = \frac{a+\sqrt{b}}{c}$, where a, b, and c are positive integers, and b is not divisible by the square of any prime. Compute $a+b+c$.

2. Let a, b, c be the roots of the polynomial $4x^3+24x^2-237x+2$. Find the value of
$$a^2(a+1)+b^2(b+1)+c^2(c+1).$$
Write your answer as a decimal rounded to the nearest tenth.

3. Suppose S is a set of functions with the property that, if $f(x)$ and $g(x)$ are in S, then $(f \circ g)(x) = f(g(x))$ is in S. Given that the functions $r(x) = \frac{x\sqrt{3}+1}{\sqrt{3}-x}$ and $s(x) = \frac{1}{x}$ are in S, compute the smallest possible size of S.