Equations that she discovered

- 2019, July

$$3\sqrt{375}=\sqrt{3375},\ 9\sqrt{1125}=\sqrt{91125}.$$

- 2019, July

$$\sqrt{3}=1+\sqrt{\frac{1}{1+\sqrt{\frac{1}{1+\frac{1}{3}}}}},\ \sqrt{45}=6+\sqrt{\frac{1}{1+\sqrt{\frac{1}{1+\frac{1}{80}}}}}.$$

Remark 0.1. (By Hiroaki Ito, Tsukuba University) It is possible to construct infinitely many similar equations using Pell's equation (the argument is nontrivial). For example, we have

$$\sqrt{1275}=35+\sqrt{\frac{1}{1+\sqrt{\frac{1}{1+\frac{1}{2499}}}}},\ \sqrt{41905}=204+\sqrt{\frac{1}{1+\sqrt{\frac{1}{1+\frac{1}{83520}}}}}.$$

- 2019, July

$$\sqrt{2}=1+\cfrac{1+\cfrac{1+\cfrac{1+\cdots}{3+\cdots}}{3+\cfrac{1+\cdots}{3+\cdots}}}{3+\cfrac{1+\cfrac{1+\cdots}{3+\cdots}}{3+\cfrac{1+\cdots}{3+\cdots}}}$$

- 2019, July

$$\frac{20!7!}{6!21!}=\frac{207}{621},\ \frac{175!56!}{55!176!}=\frac{17556}{55176},\ \frac{1500!475!}{474!1501!}=\frac{1500475}{4741501}$$

Remark 0.2. (By Kanki Masataka, Kansai University)

$$\frac{29600!9361!}{9360!29601!} = \frac{296009361}{936029601}, \quad \frac{253075!80030!}{80029!253076!} = \frac{25307580030}{80029253076}.$$

- 2019, July

$$1 + 1 + 2 + 3 + 5 + 8 + 13 + \cdots = -1.$$

Remark 0.3. This was already known. This can be "shown" by considering mother function of the Fibonacci sequence and plugging in $x = 1$.

- 2019, July (she says that she is confident that there exists a formula to yield prime numbers!!!)

  「nのフィールド上にあると仮定した軸を持った螺旋にそれと正反対の回転と角度を持った螺旋を任意の(適当な？)CBRにそって回転させていって、それがハマれば当たり」

  ＊上が彼女の「素数を求める方法」
  ＊CBRはキャプティブビーズリングの略でボディーピアスのこと。

- 2019, August

$$57 \cdot 56 \cdot 55 = 22 \cdot 21 \cdot 20 \cdot 19.$$

Remark 0.4. (By Kanki Masataka, Kansai University) The non-trivial solution of

$$x(x+1)(x+2) = y(y+1)(y+2)(y+3)$$

is only $(x, y) = (55, 19)$ for $y < 10000$.

- 2019, August

$$2 = \sqrt[3]{3 + \frac{11}{3}\sqrt{\frac{2}{3}}} + \sqrt[3]{3 - \frac{11}{3}\sqrt{\frac{2}{3}}}$$

Remark 0.5. (By Kanki Masataka, Kansai University) The above equation shows up when you solve

$$x^3 - x - 6 = 0$$

using Cardano's formula.

- 2019, August

$$\pi^2 = \cfrac{12}{1 + \cfrac{1^4}{3 + \cfrac{2^4}{5 + \cfrac{3^4}{7 + \cfrac{4^4}{9 + \cdots}}}}}$$

Remark 0.6. This expression was already known.