Challenge Number 5: A "Round" of Math (Dedicated to Allyce)

THE MATH JESTER

Fall 2024

Name: ——————————————————— Date: ——————————

Directions

Complete as many of the following problems as you can. You may use a calculator or Unix terminal for help with calculations, but show your work! Partial credit will be awarded for good reasoning.

1. Evaluate the following expression in your calculator: $\frac{4472^{12}}{3987^{12}+4365^{12}}$ [4 points]

2. Consider the number $\frac{3{,}293{,}209{,}612{,}801}{164{,}455{,}040{,}160}$. Is the fraction in simplest form? What is its square? Try using a calculator. [4 points]

3. Notice that 46368 and 75025 are Fibonacci Numbers (if you doubt this, verify it yourself). What is the value of $\left(\frac{75025}{46368} - \frac{1+\sqrt{5}}{2}\right) \times (2149991424\sqrt{5})$? [4 points]

4. If your answer to any of the above questions was an integer, that answer is not precise. Try it by hand, or at least use a higher-precision computer like a spreadsheet or Wolfram Alpha, in order to get a more precise answer. [5 points]

5. Give a deep, mathematical explanation for why each of these expressions **cannot be** the expected integer. Name or describe the theorem that would be in violation. [3 bonus points]

6. What did you learn from this excercise? [3 points]