Department of Mathematics, University of Wisconsin-Madison

Math 473 - Exam - Spring 2023

NAME : (as it appears on Canvas)

EMAIL: @wisc.edu

PROFESSOR:

INSTRUCTIONS:

Time: **50 minutes**

Please write your name on every page

No Calculators, No Notecards

You **must show your work and justify your answer** to receive credit.

You **must use correct notation** to receive full credit.

Question	Points
1	10
2	10
3	10
4	10
5	10
6	10
7	10
Total:	70

1. (10 points) Arrange the following Mathematicians in chronological order.

    1. Bhāskara I,
    2. Pierre de Fermat,
    3. Archimedes of Syracuse,
    4. Nicole Oresme,
    5. Euclid,
    6. Timo Seppäläinen,
    7. Sir Isaac Newton,
    8. Pythagoras of Samos,
    9. Leonhard Euler,
    10. Bhāskara II.

2. (10 points) Contemporary mathematics uses several common symbols that are obviously derived from the $=$ sign, including $\equiv$, $\approx$ and $\cong$. Specify at least one meaning for each of these symbols, and explain how this meaning differs from ordinary equality. Give examples to illustrate your explanations.

3. (10 points) Write the following quantities in sexagesimal notation. Then translate your answers into Babylonian notation.

   (a) $1\frac{1}{3}$,

   (b) $\frac{1}{100}$.

4. (10 points) Express the first nine multiples of the Egyptian "tenth" part as either single parts or sums of different (non-repeated) parts. Use as few parts as you can and make the denominators as small as you can. (Ignore the fact that there were special symbols for $\frac{2}{3}$, and $\frac{3}{4}$.)

5. (10 points) Quadratic equations occur all over ancient mathematics. Here is an example from Diophantus: To find two numbers such that their sum and the sum of their squares are given numbers. Diophantus takes the sum to be 20 and the sum of the squares to be 208. He also points out that to solve this it is necessary that "double the sum of the squares exceed the square of the sum by a square." Express the problem in modern terms, solve it, and explain why Diophantus needed to add a condition.

6. (10 points) Which one of Platonic Solids doesn't have dual polyhedra and why?

7. (10 points) Find the great common divisor and the linear representation of it for numbers 97 and 20 using the Euclid algorithm.