Math 365 Exam 1
S. Witherspoon
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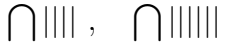
Name_____

There are 7 questions, for a total of 100 points. Point values are written beside each question. *No calculators allowed. Show your work for full credit.*

1. [8 points] (a) Order the following Egyptian numerals from least to greatest:

(b) *Without* converting to decimals, add the following two Egyptian numerals. Briefly *explain* how you obtained your answer.



2. [16] (a) Each of the following illustrates a property of addition and/or multiplication of whole numbers. Identify the property illustrated.

_____ $(2+3)+5 = 2+(3+5)$

_____ $28 \cdot 1 = 28 = 1 \cdot 28$

_____ $4 \cdot (10+2) = 4 \cdot 10 + 4 \cdot 2$

(b) Identify *two* properties illustrated by the following.

_____ $2 \cdot (19 \cdot 50) = (2 \cdot 50) \cdot 19$

3. [20] Perform each of the operations in base 5, *without* converting to base 10. Show your work. (If you wish to convert to base 10, to check your answers only, that is fine.)

(a) $11_{\text{five}} + 24_{\text{five}}$

(b) $32_{\text{five}} - 13_{\text{five}}$

(c) $12_{\text{five}} \cdot 23_{\text{five}}$

(d) $41_{\text{five}} \div 3_{\text{five}}$

4. [12] Vera calculated the following. Redo the calculation correctly, and write a sentence explaining to Vera where she made a mistake, and how to fix her calculation.

$$\begin{array}{r} 243 \\ -\ 138 \\ \hline \end{array}$$

5. [16] In each of the following, identify the sequence as arithmetic or geometric, and find the nth term.

(a) $5, 11, 17, 23, 29, \ldots$

(b) $2, 6, 18, 54, 162, \ldots$

6. [12] *Without* computing each sum, find which is greater, S or T, and by how much.

$$\begin{aligned} S &= 3+6+9+12+\cdots+99 \\ T &= 5+8+11+14+\cdots+101 \end{aligned}$$

7. [16] (**True/False and Counterexample.**) For each of the following statements, write "T" if it is true and "F" if it is false. If it is false, give a *counterexample*.

(a) _____ For all whole numbers n, $\dfrac{n+3}{3} = n$.

(b) _____ For all whole numbers n, $n+3 = 3+n$.

(c) _____ For all whole numbers n, $(n+1)^3 = n^3 + 1^3$.

(d) _____ For all whole numbers n, $\dfrac{3n}{3} = n$.