

Math 365 Exam 1
S. Witherspoon

Name _____

There are 9 questions, for a total of 100 points. Point values are written beside each question. *No calculators allowed. Show your work for full credit.*

1. [10 points] Convert 132_{nine} to base three without changing to base ten.

2. [15] Calculate the following in base five. Show all work in base five (not just a conversion to base ten and back).

$$324_{\text{five}} + 12_{\text{five}}$$

$$212_{\text{five}} \times 13_{\text{five}}$$

3. [10] Draw base five blocks to represent the computation $22_{\text{five}} + 3_{\text{five}}$.

4. [10] Calculate the following, paying close attention to the standard order of operations:

$$30 \div 5 + 4 \cdot 2 - 2^3$$

5. [10] Sam calculated $63 \cdot 2$ as follows:

$$63 \cdot 2 = (60 + 3) \cdot 2 \tag{1}$$

$$= 60 \cdot 2 + 3 \cdot 2 \tag{2}$$

$$= (10 \cdot 6) \cdot 2 + 6 \tag{3}$$

$$= 10 \cdot (6 \cdot 2) + 6 \tag{4}$$

$$= 10 \cdot 12 + 6 \tag{5}$$

$$= 120 + 6 = 126 \tag{6}$$

(a) What property of arithmetic did Sam use to get from line 1 to line 2 of his calculation?

(b) What property did Sam use to get from line 3 to line 4 of his calculation?

6. [10] Consider the sequence $5, 10, 20, 40, \dots$

(a) Find the sixth term of the sequence.

(b) Find a formula for the n th term of the sequence.

7. [10] Mary believes that $0 \div 0 = 1$ because $0 \cdot 1 = 0$. What could you tell Mary to correct her reasoning?

8. (a) [5] Find the sum $1 + 2 + 3 + \cdots + 49$.

(b) [5] Find the sum $6 + 8 + 10 + \cdots + 98$.

9. [15] (**True/False.**) For each of the following statements, write “T” if it is true and “F” if it is false. Some of the statements refer to the set of even whole numbers, which is $\{0, 2, 4, 6, 8, \dots\}$, or the set of odd whole numbers, which is $\{1, 3, 5, 7, 9, \dots\}$.

(a) _____ Subtraction of whole numbers is associative.

(b) _____ The set of even whole numbers is closed under addition.

(c) _____ The set of odd whole numbers is closed under addition.

(d) _____ $8, 11, 14, 17, 20, \dots$ is an arithmetic sequence.

(e) _____ In Roman numerals, the number one less than MMX is MMXI.