

# Math 130 Final

Name: \_\_\_\_\_

The following two algorithms have been created (and used) by students. In each case, the problem/s the student is solving is given, and then the student's work is shown. For each algorithm, you must write a brief description of the student's method (worth 4 points), state if it will work (i.e. gives you the correct answer) for this problem and justify your answer (worth 6 points), and explain if it will work for any pair of numbers and justify your answer (worth 5 points). Your explanation of why it does or does not work must be more than "it works (or doesn't work) because it is (or isn't) the same method as the standard algorithm."

1.  $7896 \div 71 =$

$$\begin{array}{r} \textcircled{111} \text{ r } 15 \\ 71 \overline{) 7896} \\ \underline{-71} \\ 825 \\ \underline{-710} \\ 7115 \\ \underline{7100} \\ 15 \end{array}$$

$$2. 2\frac{3}{5} \times 7\frac{5}{6} =$$

$$2\frac{3}{5} \times 7\frac{5}{6} = 14\frac{15}{30} = 14\frac{1}{2}$$

3. Come up with a set and an operation on that set that does have an identity but not all elements have inverses (5 points). (Your operation should *not* be just one of the standard operations  $+$ ,  $\times$ , etc.) Justify why it has an identity but not inverses (4 points). Once you have created the operation, decide if the operation is commutative (1 point), associative (1 point), and if the operation is closed (1 point) and justify your answers (6 points).

4. In each of the following problems, solve the problem (3 points), justify your solution (3 points). Determine which conception of fraction is being used and justify your answer (5 points). Determine what the whole is and justify your answer (5 points).

(a) My gas tank holds  $10\frac{1}{2}$  gallons. Each day I drive over the river and through the woods and back home and it takes a quarter of my tank to do this. How many days can I drive over the river and through the woods (and back home) before needing to refill my tank?

(b) Aaron baked 24 cookies for his class of 20 students. Bret baked 50 cookies for his class of 48 students. If each class shares their cookies equally, whose students get more cookies?

5. (10 points) Earlier this year, suppose that your Math 130 TA wrote 103 on the board. What numbers might this have represented? Justify your answer.

6. (7 points) What number base is the following problem in (assuming it is being done correctly)? Justify your answer.

$$\begin{array}{r} 6\overset{2}{3}\overset{11}{2}\overset{1}{5} \\ - 4266 \\ \hline 2026 \end{array}$$

7. (a) (7 points) Create a measurement problem that would be solved by the expression  $\frac{4}{7} \div \frac{2}{2}$ .

(b) (7 points) Create a partitive problem that would be solved by the expression  $\frac{4}{7} \div \frac{2}{2}$ .

8. (10 points) Discuss one problem solving strategy that you have used on multiple problems this semester and how you used it. Has this method always been helpful? Why or why not?

9. For each of the following problems, solve the problem (4 points) and justify your solution (5 points):

(a) I have  $2\frac{2}{3}$  jars of tranquilizer fluid and need half of that to sedate a bear. How much fluid do I need to sedate a bear?

(b) I have  $1\frac{1}{3}$  of a bag of fertilizer. Each flower bed needs  $\frac{1}{2}$  bag of fertilizer. How many flower beds can I fertilize?

**Extra Credit (5 points):** Which numbers have exactly three factors? Justify your answer.