PLEASE READ THIS PAGE!!!

1. Hints:
   • You might want to quickly look over all of the questions and start by working the questions that are easiest for you.
   • Check your answers only if you have time.
   • Many of the questions have multiple parts. Don’t automatically give up on a question because you don’t know how to do one part.
   • Consider showing your work, even when it’s not requested. This could help you earn partial credit for an incorrect answer.
   • You don’t get extra points for finishing early. If you have extra time, please consider checking your work over one more time before turning in your paper.

2. Reminders:
   • No calculators, cell phones, PDAs, or any other electronic devices are allowed.
   • You are allowed to use the one 3” × 5” index card of notes that you prepared for use with this exam. No other type of written materials is allowed.

3. Read the following statement and sign your name:

   On my honor, as a student, I have neither given nor received unauthorized aid on this academic work.

   Signature: ____________________________________________

4. Please make sure that your exam contains five pages, including this one.

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1. (3 points each) Circle either “True” or “False” for each of the following:

   a) True False: In the “understand the problem” step, it is helpful to restate the problem in your own words. That way, you weed out any unnecessary information and you make sure that the problem makes sense to you.

   b) True False: \(2 + 3 = 3 + 2\) is an example of the commutative property for whole number addition.

   c) True False: Numeration system attributes tell us about how we take a string of symbols in a numeration system (such as MCMXLI) and convert this string to a number (an actual value).

   d) True False: \(3_2\) is a base 2 numeral.

2. (4 points each) Find the missing term in each of the sequences below. Also circle the sequence type. (The missing term is worth 3 points and the sequence type 1 point.)

   a) 2, 1, \(\frac{1}{2}\), \(\frac{1}{4}\), ________ Arithmetic Geometric Neither

   b) 1, 2, 2, 3, 3, 3, 4, 4, 4, ________ Arithmetic Geometric Neither

3. a) (5 points) Convert 135\(_6\) to base 10. Show your work.

   b) (5 points) Convert 74 to base six. Show your work.
4. (5 points) Which base seven numeral follows $566_7$?

5. You are a student teacher at an elementary school. Let our universe $U$ be the set of students at this school. Let $A$ be the set of students in your class, $B$ be the set of students in the school who take music lessons, and $C$ be the set of students in this school who participate in city sports leagues after school. Toby, Sara, Terry, and Tim are four of the students in your class. Toby only takes music lessons, while Tim only participates in the city sports leagues. Sara takes music lessons and participates in the city sports leagues. Terry neither takes music lessons nor participates in the city sports leagues.

a) (10 points) Draw a Venn diagram representing this information. Indicate the four named students in the diagram. Shade the set $A - (B \cup C)$.

b) (5 points) Describe (in words) the set $C$.

6. a) (4 points) Illustrate the addition of 2 and 3 on the whole number line.
b) (4 points) Illustrate $5 - 2$ on the whole number line using the take away approach.

c) (4 points) Write a short story problem which would be solved by $5 - 2$ and where the situation is best represented by the missing addend approach.

7. We will define $f$ by the following table:

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<th>$x$</th>
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a) (4 points) Draw an arrow diagram summarizing this information.

b) (2 points) What is the domain of $f$?

c) (4 points) Does $f$ define a function on its domain? If $f$ is not a function, how would you modify the table defining $f$ so that $f$ would be a function?
8. (10 points) Determine the validity of the following argument. Justify your answer with a Venn diagram or a truth table.

**Hypothesis:** If a student’s score on the first midterm were 90% or higher, then that student got an A on the first midterm.

**Fact:** Terry did not get an A on the first midterm.

**Conclusion:** Therefore, Terry’s score on the first midterm was below 90%.

9. You are told that the fifth term in an arithmetic sequence is 10 and that the seventh term is 14.
   a) (6 points) What is the common difference $d$ for this arithmetic sequence? Show your work.
   b) (4 points) What is the first term in this arithmetic sequence? Show your work.

*Hint:* You don’t need a formula for solving this problem. Think about the definition of an arithmetic sequence and draw a picture.

10. (4 points each) Calculate the following mentally. Do not erase or cross out any of your calculations.
   a) $999 + 847$

   b) $7083 - 29$