Instr: Paul Terwilliger
Spring 07

Math 130 Midterm II

Your Name _____

NO CALCULATORS ALLOWED. Show all your work. CLEAR AND APPROPRIATE EXPLANATIONS COUNT FOR JUST AS MUCH AS THE CORRECT NUMERICAL ANSWER.

1. The numbers A and B are shown on the number line below. Find the points on the number line that correspond to the following: (i) $-A+B$; (ii) $-(A+B)$; (iii) $A+B$; (iv) $-(B-A)$. Label your answers clearly.

2. Compute $3/4 - 2/3$ and express your answer as a fraction. Explain why your method is valid using the number line below.

3. A \$40 sweater was reduced 20% in a sale. Later the sales price was reduced 10%. What was the price then? Explain your reasoning using the definition of percent.

4. The price of a shirt is marked down 35% to \$26. What was the original price? Explain your reasoning using the definition of percent.

5. Describe a way to solve $204 - 81$ mentally, by using reasoning other than the standard subtraction algorithm. Then write a coherent sequence of equations that correspond to your reasoning.

6. One type of floor tile costs \$70 per square yard. A second type of floor tile costs \$7.90 per square foot. Which type of tile is more expensive? Explain your reasoning.

7. How many different three-digit numbers can be made using only the digits 2,3,4 where repeated digits are allowed (so that 232 and 334 are counted)? Show how to solve this problem with an organized list and tree diagram. Use the meaning of multiplication to explain why this problem can be solved by multiplying.

8. A cube that is 1 foot tall, 1 foot wide, and 1 foot deep is made out of smaller cubes that are each 1 inch tall, 1 inch wide, and 1 inch deep. The large cube is painted on the outside.

(i) How many of the smaller cubes have paint on them? ans _____

(ii) How many of the smaller cubes have paint on exactly two sides? ans _____

(iii) How many of the smaller cubes have paint on exactly three sides? ans _____

9. Determine which of the following two numbers is larger, without actually calculating each number explicitly. Explain your reasoning. The numbers are:

(i) $1,000,000 \times (1 + 2 + 3 + \cdots + 1,000,001)$;

(ii) $1,000,001 \times (1 + 2 + 3 + \cdots + 1,000,000)$.

10. Draw a subdivided array to show that $7 \times 6 = 5 \times 5 + 5 \times 1 + 2 \times 5 + 2 \times 1$. Then write a coherent sequence of equations and use the properties of arithmetic to show why the preceding equation is true.

11. Use the partial products algorithm to calculate 27×28. Illustrate the meaning of this algorithm using a rectangular array diagram.