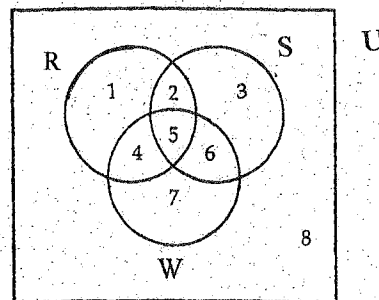


FINAL EXAMINATION – FALL 2014  
Mathematics 1401 (1.95)

INSTRUCTIONS: Answer any TEN questions. Each problem is worth 10 points.  
For problems #1-9, please write all your work and answers in the booklet. All work must be shown for full credit.

1. (a) In the college union, 125 students were surveyed as to what board games they played. The survey showed that 76 students played chess, 45 played checkers, and 18 played neither game. Let  $U = \{\text{all students surveyed}\}$ ,  $C = \{\text{students who play chess}\}$ ,  $K = \{\text{students who play checkers}\}$ .

- (i) How many students played exactly one of the two board games? (ii) Find:  $n(\overline{C \cap K})$



- (b) Let  $U = \{\text{all objects}\}$ ,  $R = \{\text{red objects}\}$ ,  $S = \{\text{square objects}\}$ , and  $W = \{\text{objects weighing more than 11 pounds}\}$ . The regions of a Venn diagram are labeled 1-8.

- (i) Place the following object in the appropriate region. If the object could appear in more than one location, indicate all regions in which it might be placed.

Item  $x$ : A green square.

- (ii) Describe the following sentence in set notation and indicate which region (regions) would represent the given set: *The set of all triangular objects that weigh 8 pounds.*

- (iii) Describe region 4 in words and in set notation.

2. (a) Convert the repeating decimal  $0.257575757\dots$  to a common fraction. Reduce your answer to lowest terms.  
(b) Find 5 rational numbers between  $\frac{3}{13}$  and  $0.23$ . If you think that there aren't any, then write NONE.  
(c) 20 inches is what fraction of a yard? (Hint: 1 yard = 3 feet; 1 foot = 12 inches).  
(d) Write the number described in words as a reduced common fraction and as a percentage:  
**forty-eight thousandths.**

3. (a) Without converting to base ten, subtract the numbers in base TWELVE :  $9E1_{\text{twelve}} - 23_{\text{twelve}}$

- (b) What base- three number is represented by the base-three blocks shown below?

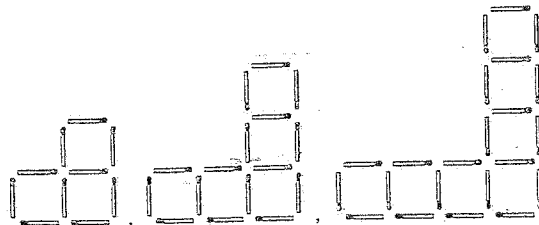
Hint: make all possible exchanges to obtain the smallest number of pieces.



- (c) Convert 397 to a number in base FOUR.

- (d) Find the next two numbers in the sequence:  $11_{\text{six}}, 22_{\text{six}}, 44_{\text{six}}, \dots$

4. Assume that the pattern continues for the following sequence of matchstick square figures.



- (a) How many matchsticks are there in the 4<sup>th</sup> and the 5<sup>th</sup> figures?  
(b) How many matchsticks does it take to build the  $n^{\text{th}}$  figure?  
(c) How many matchsticks will it take to build the 45<sup>th</sup> figure?  
(d) What is the total number of matchsticks that is needed for the first 45 figures? (Hint: use Gauss' method.)  
(e) Is there a figure in the sequence that is made up of exactly 562 matchsticks? If so, which one? If no, why not?

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

Final Exam Math 1401 (1.95) FALL 2014

Solve each problem in parts (i) and (ii). Conclude which of the problems can be solved by calculating  $1\frac{7}{9} \div 6$

- (i). Maria bought  $1\frac{7}{9}$  ounces of walnuts. She gave one-sixth of that amount to a friend. How many ounces of walnuts did her friend receive?

(Give an **exact** answer in **ounces** using **common fractions or mixed numbers**).

- (ii) If  $1\frac{7}{9}$  cups of flour makes  $\frac{1}{6}$  of a batch of cookies, then how many cups of flour are required for a full batch of cookies?

Give an **exact** answer using **common fractions or mixed numbers**.

- (b) Find the Greatest Common Factor and The Least Common Multiple of the numbers 2183 and 851.

6. A girl has  $17\frac{5}{6}$  in. of ribbon available to decorate dolls. Each doll requires  $1\frac{3}{8}$  in. of ribbon.

(a) How many dolls can be decorated?

(b) How much material will be left over?

(Give an **exact** answer in **inches** using **common fractions or mixed numbers**).

- (b) Place parentheses, if needed, to make the following statement true:  $72 \div 4 \times 3 + 6 = 4$

7. (a) A school store has 300 pencils, 225 erasers, and 450 notepads that the store can use to make packages. Each package must contain the same number of each *type* of supply and no items can be left over. What is the largest number of packages that the store can make this way? How many pencils, erasers, and notepads will go into each package?

- (b) Find all possible single digits that can be placed in the blank so that the number  $7\_6,524,710,416,604,302$  becomes divisible by 6.

8. (a) In a history class, there are 24 business majors, 36 education majors, and 15 biology majors. No person has a double major. Suppose one student will be chosen at random to participate in a contest. What is the probability that the contest participant will NOT be a business major? (Express your final answer as a percent).

- (b) The owner of a small business earned \$450,000 last year. The manager earned \$130,000. Three assistant managers earned \$65,000 each. The secretary earned \$25,000 and the other 4 employees each earned \$40,000. Find the mean, median, and mode of the given salaries. Which measure is most appropriate for this set of data?

9. Answer TRUE or FALSE to the following statements. Give a brief **reason or a counterexample to justify each answer**.

(a)  $\text{LCM}(24, 100) = 24 \times 100$

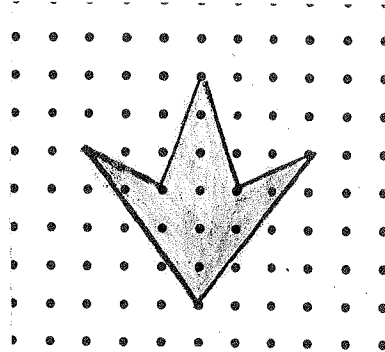
- (b) Let  $K = \{a, b, c, d, e\}$  and  $L = \{1, 2, 3, 4, 5\}$ . There are 25 one-to-one correspondences between the sets K and L.

- (c) The number 893 is prime, because it is not divisible by 2, 3, 5, 7, and 11.

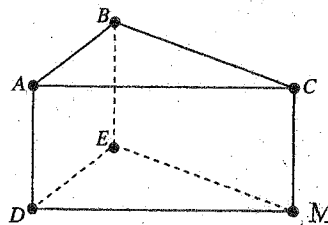
(d)  $\frac{1}{7} \text{ of } 30 = 30 \div 7$

problems #10-11, PLEASE SHOW ALL YOUR WORK AND ANSWERS IN THE SPACES PROVIDED.

10. In the figure on the right, assume that the distance between two adjacent dots in a row or a column is 1 cm.
- (a) Determine the area of the figure.
  - (b) Draw all lines of symmetry of the figure, if any.
  - (c) Is the figure *convex*?



11. (a) A right triangular prism is drawn to the right.
- How many faces, vertices, and edges does this solid have?
  - Which edges are parallel to AD?
  - Which edges are skew to AD?



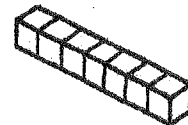
- (b) The two solids in the figure to the right are made out of identical cubes. Each cube has sides with a length of 1 cm.

Find the surface area of each solid .

(i)



(ii)



Find the volume of each solid .