DEPARTMENT OF MATHEMATICS   Name:_____
                                                   BROOKLYN COLLEGE

                                                FINAL EXAMINATION – SPRING 2018
                                                      Mathematics 1401

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) Convert the repeating decimal $0.\overline{513}$ to a common fraction. Reduce your answer to lowest terms.
   (b) 8 inches is what fraction of a *yard*? Reduce the fraction to lowest terms. (Hint: 1 yard=3 feet, 1 foot=12 inches).
   (c) Write the number described in words as a reduced common fraction **and** as a percentage:
                                          fifty-six thousandths.

2. (a) A merchant surveyed 140 customers to determine what cooking appliances they used. The survey showed that
      95 people used microwave ovens, 68 people used gas ranges, and 20 used neither.
      Let U= { all people surveyed}, M = { people who use microwave ovens}, G={ people who use gas ranges }.

   (i) How many people used exactly one of the two types of appliances?
      (ii) Find $n(\overline{M \cap G})$

   (b) Suppose U = {all objects}, B={ blue objects},
       M ={metal objects}, and R={rectangular objects}.
       The regions of a Venn diagrams 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.

                    A metal object that is not blue.
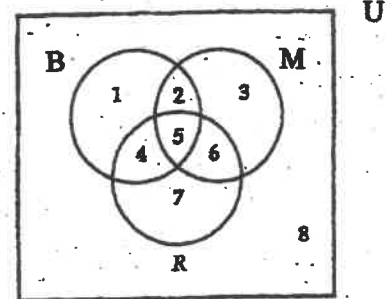
       (ii) Describe the following sentence in **set notation** and **indicate which region (regions)** would represent
            the given set:
                     The set of all non-rectangular objects that are made of wood.

3. Suppose you save $10 one month and that each month thereafter you save 50 cents more than the preceding month.
    How much will you have saved by the end of 14 years?

4. (a) Without converting to base ten, find the next *two* numbers in the sequence:
            $11_{eight},\ 22_{eight},\ 44_{eight},\ 77_{eight},\ldots$
   (b) Without converting to base ten, subtract the numbers in base TWELVE: $T72_{twelve} - 83_{twelve}$.
   (c) Convert 123 to a number in base TWO.

5. (a) A store has 84 apples, 72 bananas, and 96 oranges to make fruit baskets. Each basket must contain the same
       number of each type of fruit and no items can be left over.
       Find **all possible numbers** of baskets that the store can make this way **and** indicate how many apples, bananas,
       and oranges will go into each basket.

   (b) Let $q = 397,508,931,265,347$. Answer each of the following questions **without performing the actual
       division:**
       (i) Is q divisible by 9?
   (ii) Are the numbers q and 24 *relatively prime*? **Fully explain.**

Name:_____

Final Exam Math 1401 SPRING 2018

6. (a) A girl has 90 in. of cloth to make doll costumes. Each costume requires $6\frac{9}{16}$ in. of cloth.

    (i) How many costumes can she make?

    (ii) How much material will be left over?

    (Give an **exact** answer **in inches** using a **common fraction or a mixed number in simplest form**).

    SHOW YOUR WORK STEP BY STEP.

  (b) Place parentheses, if needed, to make the following statement true: $72 - 48 \div 4 \times 2 + 8 = 69$

7. (a) (i) Maria used $3\frac{1}{6}$ quarts of paint to paint $\frac{1}{8}$ of a wall. How many quarts of paint will it take to paint the whole wall?

    (Give an **exact** answer using a **common fraction or a mixed number in** *simplest form*).

    (ii) A recipe calls for $3\frac{1}{6}$ cups of flour for a batch of 24 cookies. You want to make 3 cookies. How many cups of flour should you use?

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

    (iii) Which of the two problems above can be solved by calculating $3\frac{1}{6} \div \frac{1}{8}$?

  (b) Find the Greatest Common Factor and The Least Common Multiple of the numbers 1591 and 851.

8. (a) There are 12,500 students at Brooklyn College. About 1500 of them are in the Elementary Education program. Suppose one student will be picked at random and given a full scholarship. What is the probability that the winner will NOT be in the Elementary Education program?

    (Express your final answer as a percent).

  (b) In a certain company with **ten** employees the four lowest paid employees each have a salary of $30,000. The next lowest paid employee has a salary of $40,000 and the five highest paid employees have an average salary of $60,000.

    (i) What is the **mean** salary of all ten employees?

    (ii) Can you determine the **median** salary of all ten employees? Explain.

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

  (a) The sequence given bellow is *geometric* .

    1, 4, 9, 16, 25, 36, ...

  (b) Let K = {a, b, c, d} and L={1, 2, 3, 4}. If *c* must correspond to **an odd number** in each one-to-one correspondence, then there will be 12 one-to-one correspondences between the sets K and L.

  (c) To determine if 893 is prime, it is enough to test if it is divisible by 2, 3, 5, 7, and 11.

  (d) $\frac{2}{7}$ *of* $42 = 42 \div \frac{2}{7}$

Final Exam Math 1401   SPRING 2018

For **problems #10-11**, *PLEASE SHOW ALL YOUR **WORK** AND **ANSWERS** IN THE **SPACES PROVIDED**.*
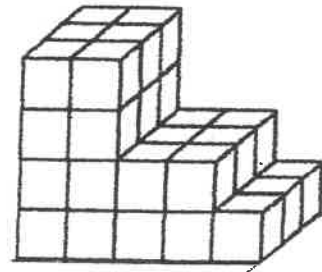
10. In the figure on the right, assume that the distance between two adjacent dots in a row or a column is 1cm.

    (a) Is the figure *convex*?
    (b) Draw all lines of symmetry of the figure.
    (c) Determine the area of the figure.
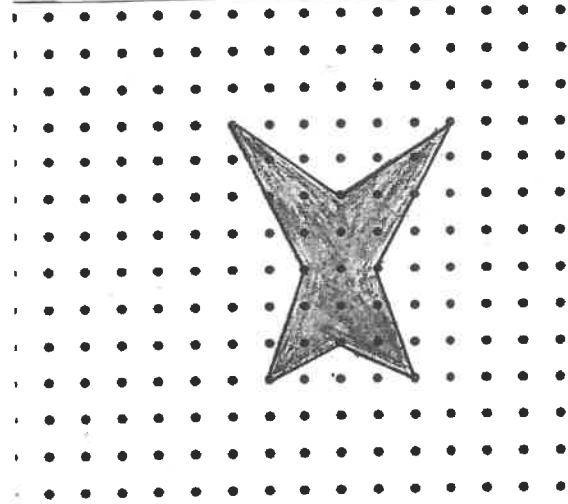
11. The solid in the figure to the right is made out of identical cubes.
    Each cube has sides with a length of 1 cm.

    (a) Find the surface area of the given solid.

    (b) Find the volume of the solid.

    (c) Suppose the solid is decomposed into individual cubes (each with a side length of 1 cm).

      (i) What will the **total** volume of all the cubes be?

      (ii) What will the **total** surface area of all the cubes be?