Instructions: Answer any **TEN** out of 11 problems. Each problem is worth 10 points. **All work must be shown for full credit.**

By writing your name below, you are pledging that you have neither given nor received assistance on this exam.

Name: _____

1. (a) A recipe calls for $3\frac{1}{6}$ cups of water for a batch of 20 cookies. How many cups of water would you need for five cookies? (Give an **exact** answer using **common fractions or mixed numbers**).

   (b) Jane pumped $3\frac{1}{6}$ gallons of gasoline into her empty gas tank. Now it measures $\frac{1}{4}$ of a tank. How many gallons does her tank hold? (Give an **exact** answer using **common fractions or mixed numbers**).

   (c) Which of the two problems above can be solved by calculating $3\frac{1}{6} \div 4$?

2. (a) Amy has $62\frac{1}{4}$ feet of material for window curtains. All of the windows are the same size and require $6\frac{1}{2}$ feet of material each.

   i. How many window curtains can she make? (Give an **exact** answer using **common fractions or mixed numbers**).

   ii. How much material will be left over? (Give an **exact** answer in feet using **common fractions or mixed numbers**).

   (b) i. Express the repeating decimal 0.3515151... as a common fraction. Reduce your answer to the lowest terms.

   ii. Find three rational numbers between $\frac{2}{11}$ and $\frac{3}{11}$. If you think there aren't any, write NONE.

3. Maria and Mark work at the Bay Multiplex Theatre. Maria is working at Theatre I and Mark is working at Theatre II. Both movies start their first show at 6:00pm. Theatre I is showing its movie every 15 minutes; Theatre II is showing its movie every 105 minutes.

   (a) At what time will both movies start again at the same time?

   (b) At that time, how many movies will each Theatre have shown?

4. The salaries of 10 employees at a business were:

$20,000	$80,000	$40,000	$50,000	$295,000
$60,000	$30,000	$120,000	$150,000	$175,000

   (a) Find the mean, median, and mode of the given salaries.

   (b) Which measure is most appropriate for this set of data?

5. Write TRUE or FALSE for each of the following statements. Give a brief **reason or a counterexample to justify each answer.**

   (a) The following sequence is arithmetic: 9, 32, 55, 78, 101.

   (b) The number 864,791,253 is a prime number.

   (c) If $A = \{1, 3, 5, 7, 9\}$, $B = \{2, 4, 6, 8, 10\}$ and $U = \{1, 2, 3, ..., 10\}$, then $A \cap B = U$.

   (d) $\dfrac{1}{4}$ of $60 = \dfrac{1}{4} \div 60$

6. Let A be the experiment "Picking a number from 10 to 20", $A = \{10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20\}$. Let B be the experiment "Picking a prime number from 1 to 20".

   (a) Write the sample space for the experiment B.

   (b) Find $A \cap B$.

   (c) If a number is selected randomly from set A, find the probability of picking a prime number from set A.

   (d) Find $A - B$.

7. (a) Without converting to base ten, find the next term in the sequence:

$$1110_{two}, \ 10110_{two}, \ 11110_{two}$$

   (b) A teacher earns a starting salary of $\$32,000$ with a $\$2,500$ increase every year. What will his salary be during the 19th year of service?

   (c)   i. Draw the next figure in the sequence:

       ii. Determine how many matchsticks you need to build the 50th figure.

8. (a) All 34 of the students in a mathematics class attended class on Monday. On Tuesday only 24 students attended. What was the percent of decrease?

   (b) Simplify the following expression and present your result in the most simplified form with positive exponents:

$$\left(\frac{2}{3}\right)^{-1} \div \left(\frac{5}{2} - 1\right)$$

   Show your work step by step.

   (c) Compute the product 897×689 using the Lattice Method.
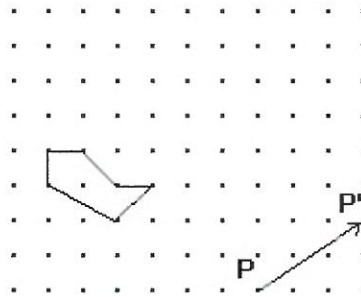
9. (a) In the figure at the right, assume that the distance between two adjacent dots in a row or column is 1 cm.

    i. Draw all lines of symmetry of the figure.

    ii. Determine the area of the figure.

    iii. Determine if the figure is convex or concave.

    iv. Locate the point of symmetry of the figure (if it exists).
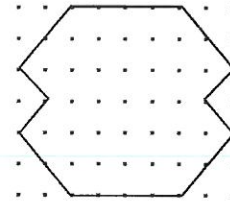
    (b) Find the image of the given figure under the translation that takes P to P'.

10. Consider the rectangular prism at the right.

    (a) How many faces, vertices and edges does the solid have?

    (b) Name a line $//$ to $\overleftrightarrow{EF}$.

    (c) Name a line **skew** to $\overleftrightarrow{DE}$?

    (d) Find the surface area of the solid.

    (e) Find the volume of the solid.