MAT 118 Final Exam
Spring 2015

Name: ________________________________

Instructor: (circle one) Jinxia Xie AnnMarie O’Neil

Directions: Answer all of the following questions. Some questions may have multiple parts. Be sure to show all of your work. Unsupported claims will receive little or no credit. You may use a calculator (not the one on your cell phone). There should be no collaboration with anyone else. Be sure to explain your answers as clearly as you can. If you need more space to work on a problem, clearly indicate where the solution to the problem can be found.

<table>
<thead>
<tr>
<th>Problem Group Test</th>
<th>Possible Points</th>
<th>Your Points</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>
1. (5 pts) Jenna says that she can prove that the two triangles below are congruent. Erika disagrees. She says that there is enough information to prove the two triangles similar, but you cannot prove them congruent because the length of the third side of each triangle is missing. Who is correct? Justify your answer.

![Triangle Diagram](image)

Note: Drawings are not necessarily to scale.

2. (8 pts) Classify each of the following statements as either TRUE or FALSE. If the statement is false, provide a counterexample or correct the statement. If the statement is true, justify your answer using what you know about the definitions of geometric figures.

a. All equilateral triangles are isosceles triangles.

b. If a parallelogram has one right angle, then it is a rectangle.

c. Alternate exterior angles are supplementary when a transversal intersects two parallel lines.

d. All rectangles are similar.
3. (6 pts) Assume the blank square below represents 1 unit. Answer the following questions for each of the squares.

\[ \text{Square 1} \quad \text{Square 2} \]

a. What fraction of the square is more darkly shaded?

Square 1: Square 2:

b. Write the multiplication sentence that indicates how the darkly shaded fraction is obtained.

Square 1: Square 2:

4. Montana Silversmiths is having a sale, and all merchandise is 30% off. Jenny uses a coupon for 1/2 off any one sale item, and she buys 4 identical bracelets. If she pays $147 for the 4 bracelets,

a. (3 pts) What was the sale price for each bracelet?

b. (3 pts) What was the original price for each bracelet?
5. (6 pts) If the circles in A represent $\frac{3}{5}$, what do the circles in B represent? Justify your reasoning.

A. [Diagram of circles]

B. [Diagram of circles]

6. A landscape architect is designing a symmetrical flowerbed to wrap around a circular patio, as shown. The radius of the patio is 6 ft, and the width of the flowerbed is equal to the diameter of the patio.

a. (5 pts) What is the area of the flowerbed?

b. (5 pts) What is the perimeter of the flowerbed?
7. Lines $r$ and $s$ in the figure below are parallel. $\overline{AE}$ and $\overline{BD}$ intersect at point $C$.

![Diagram of parallel lines with intersecting points A, B, C, D, and E.]

a. (4 pts) Prove that $\triangle ABC$ is similar to $\triangle EDC$.

b. (3 pts) Given that $\overline{DE} = 6.9$ cm, $\overline{CD} = 4.6$ cm, and $\overline{AB} = 3$ cm, find the length of $\overline{BC}$. 
8. (8 pts) Illustrate the following using a diagram. Then use the diagram to find a solution. Be sure to label your illustrations (including what represents "1" in the diagram).

a. \( \frac{3}{4} \times \frac{1}{3} \)

b. \( \frac{5}{6} \div \frac{2}{3} \)

9. (8 pts) Suppose that \( 0 < a < 1, b > 1, \) and \( 0 < c < 2. \) Use >, =, <, or CT (can’t tell) to describe the relationship between the following numbers. Justify your answer.

a. \( a \times b \) and \( c \)

b. \( b \div a \) and \( b \)
10. Out of every 100 students at a two-year college, 48 are female.

a. (2 pts) Express the number of females to males as a ratio.

b. (3 pts) Will the ratio remain the same, become greater, or become smaller if 10 more females and 10 more males join the college? Explain.

11. (6 pts) Illustrate $0.8 \div 0.3$ by drawing a model using base-10 blocks. Explain your model and solution. Give your answer as a fraction. Be sure to state what you take to be one unit.
12. Use the following numbers to answer the questions below:

\[ \sqrt{36}, \frac{3}{4}, 4.55555..., \pi, 0, \frac{13}{16}, \sqrt{8}, -1.914, 0.172 \]

a. (2 pts) Which numbers above are irrational numbers? How do you know?

b. (5 pts) For the rational numbers above, rewrite them as either fractions or integers, if they are not already given in that form.

c. (3 pts) Find a number that is between \( \frac{3}{4} \) and \( \frac{13}{16} \). Explain how you found it.