

Directions: Be sure to justify your claims by showing and explaining your thinking on every problem. You may refer to class notes, handouts, and the textbook, but you may not seek or provide assistance in any other way. Any such assistance is academic dishonesty and will result in a score of 0 on the exam.

Due: **Beginning of your Final Exam Time.** Highest Possible Score: **100 points.**

- [5pts] Explain how to find two rational numbers between $\frac{11}{34}$ and $\frac{5}{17}$.
- [5pts] Imagine you are comparing a pair of fractions with your classmate Marvin. Since each fraction is one part above 1 (e.g., $\frac{15}{14}$), Marvin says the fraction with the larger denominator is the larger fraction. How would you respond to Marvin?
- [15pts] Show how to find the quotient and remainder when 3045 is divided by 17 in two ways—once using the standard algorithm (long division), and once using an alternative algorithm of your choice.
- Consider the mega-sized number $N = 2^5 3^2 7^4 101^7$. Answer each of the following using prime factorizations only (do NOT refer to the results of calculator computations)
 - [2pts] Is N divisible by 7? Explain.
 - [2pts] Is N divisible by 202? Explain.
 - [2pts] Is N divisible by 72? Explain.
 - [2pts] Is N divisible by 35? Explain.
 - [2pts] What is the prime factorization of the product $300 \times N$?
 - [5pts] Is $2^3 3^2 7^3 101^7$ a multiple of N , a factor of N , or neither? Explain.
 - [5pts] What is the greatest common factor of N and 72,720? Explain.
 - [5pts] What is the least common multiple of N and 72,720? Explain.
- In class, we discussed the Sharing Model and Measurement Model as two different ways of thinking about division. In each of the following tasks, represent the division using both of the two models for division.
 - [5pts] $21 \div 3$
 - [5pts] $12 \div \left(1 \frac{1}{2}\right)$
- [10pts] The product $\frac{3}{4} \times \frac{5}{6}$ means “three-fourths of five-sixths”. Show three different ways to illustrate this product. In each of your illustrations, be sure to mark the unit and explain in words how “three-fourths of five-sixths” is apparent in your drawing.
- [10pts] Suppose you’d like a group of four fifth graders to understand the product $\frac{3}{4} \times \frac{8}{3}$. Assuming the students understand the set model of fractions and you have a large bowl of marbles in your classroom, how might you go about helping the students to understand the product? Include at least three drawings in your response.
- [15pts] Solve each of the following, explaining your reasoning.
 - Yesterday James ate $\frac{1}{2}$ of a pizza. Today James ate $\frac{1}{3}$ of a pizza of the same size. How much more pizza did James eat yesterday than today?
 - Yesterday James ate $\frac{1}{2}$ of a pizza. Today James ate $\frac{1}{3}$ of the whole pizza. Nobody else ate any of that pizza. How much pizza is left?
 - Yesterday James ate $\frac{1}{2}$ of a pizza. Today James ate $\frac{1}{3}$ of the pizza that was left over from yesterday. Nobody else ate any of that pizza. How much pizza is left?
- [5pts] Write a paragraph describing one or more things in this class that *surprised* you. (Any response with at least five complete sentences and no profanity will earn full credit on this task.)