

# MATH 149

Spring 2017

## Final Project

This exam has to be typed, with pictures drawn on a computer as well, not drawn by hand and scanned. The project has to be prepared using LaTeX. For creating images, you may use any software you like. TikZ package in LaTeX, Geometer's Sketchpad, GeoGebra, Mathematica, and Maple are some possible choices. Submit your project via email ([mnogin@csufresno.edu](mailto:mnogin@csufresno.edu)), both in original (LaTeX and image files) and PDF format, no later than on Thursday, May 18, 2017.

This project may be completed individually or in small groups (up to 3 people). If you choose to work in a group, using overleaf is suggested. All members of the group will receive the same grade. You may use any materials, including any books and anything posted on Internet. You may communicate with anybody you want, including your classmates and instructor. However, every person/group should create all of his/her/their pictures and type all of his/her/their text by himself/herself/themselves. While sharing ideas and/or getting help is OK and is even encouraged, no copying of files between individuals/groups is allowed.

1. (7 points) Explain in detail why a decimal represents a rational number if and only if it is either terminating or repeating.
2. (4 points) Two triangles are similar. One triangle has sides 4, 5, and 6. Two sides of the other triangle are 10 and 15. What is the third side of the second triangle?
3. (6 points) Solve each of the following inequalities in two different ways:
  - (a)  $x^2 - 4x + 3 \leq 0$
  - (b)  $x^2 + 4x + 4 > 0$
  - (c)  $\frac{1}{(x-3)^2} > 4$
4. (8 points) Prove the Pythagorean Theorem in four different ways.