

# MATH 149

Spring 2012

## Final Exam

This exam has to be typed, with pictures drawn on a computer as well, not drawn by hand and scanned. You may use any software you like. LaTeX, Word, Geometer's Sketchpad, GeoGebra, Mathematica, and Maple are some possible choices. Submit it via email ([mnogin@csufresno.edu](mailto:mnogin@csufresno.edu)), preferably in PDF format, no later than on Thursday, May 17, 2012.

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 should create all of his/her pictures and type all of his/her text by him/herself. While getting help is OK and is even encouraged, no copying of files 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.