

Math 125 Writing Up Problem 1: Cutting a Mathematician's Birthday Cake
DUE FRIDAY, JANUARY 25

Dr. Loveless likes to bake (mostly pies, but for this exercise let's say he likes to bake cakes). He bakes a cake in the shape of an isosceles **right** triangle when viewed from above. You are to cut a parabola shaped piece out of the cake such that the parabola is

- A. symmetric with respect to the line bisecting the hypotenuse and the right angle of the triangle
- B. tangent to the sides of the triangle.

Consider the region that is bounded by the parabola and the hypotenuse of the triangle.

Complete the following two tasks in a nice write-up including a good picture with all essential points labeled:

1. What parabola will achieve the maximum possible area of this region? (Your answer will be in terms of the labels from your picture).
2. Assume the hypotenuse of the cake has length 2 feet. After making the maximum possible area cut from part 1, the cake is now in four pieces. Give the area for each piece.

Hints: If you are stuck, list out all the facts and relationships you can find. Then remember you can ask me or your TA for some help.