WRITTEN HOMEWORK 9, MATH 200, FALL 2015

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This homework **may be modified from section to section!** Check your section's website for any modifications to this homework for your section.

Problem 1

Solve Problem 8 of 2012WT1 by describing the crescent in polar coordinates and evaluate the double integrals to find the total mass and the x-coordinate of the centre of mass.

Problem 2

Let D be the interior of the circle of radius r with centre (x_0, y_0). Show that

$$\int\int_D x\, dA = x_0 \pi r^2.$$

What is the x-coordinate of the centre of mass of D (with unit density)? Can you give an intuitive explanation to this answer?

Problem 3

Solve Problem 8 of 2012WT1 with the following (shorter) method: note that the crescent in question is the region bounded by the circle $x^2 + y^2 = 1$ minus the region bounded by the circle $x^2 + y^2 = x$. For part (i), find the area for each of the two circles and take their difference. For part (ii), use this same idea along with your result from Problem 2. Make sure that the answers you get for this problem agree with your answers for Problem 1.

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