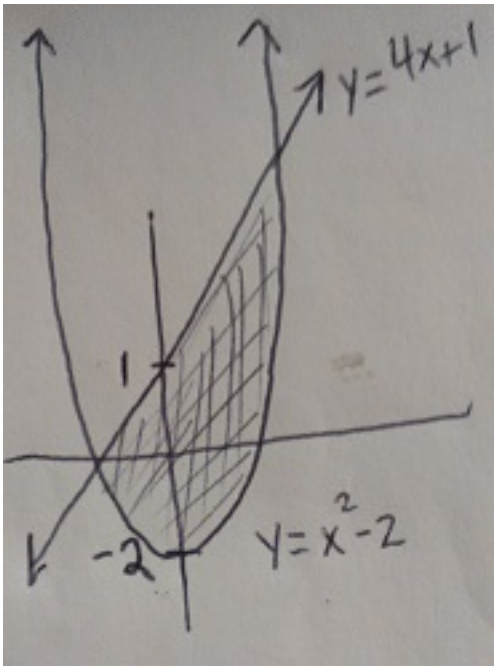
MATH 14-3D2 Spring 2014
Quiz 10 SOLUTIONS

Show all work clearly and in order (on this sheet or an attached sheet) and circle your final answers.
Justify your answers algebraically whenever possible. Work without justification may not receive credit.
You have 25 minutes to take this 10 point quiz.

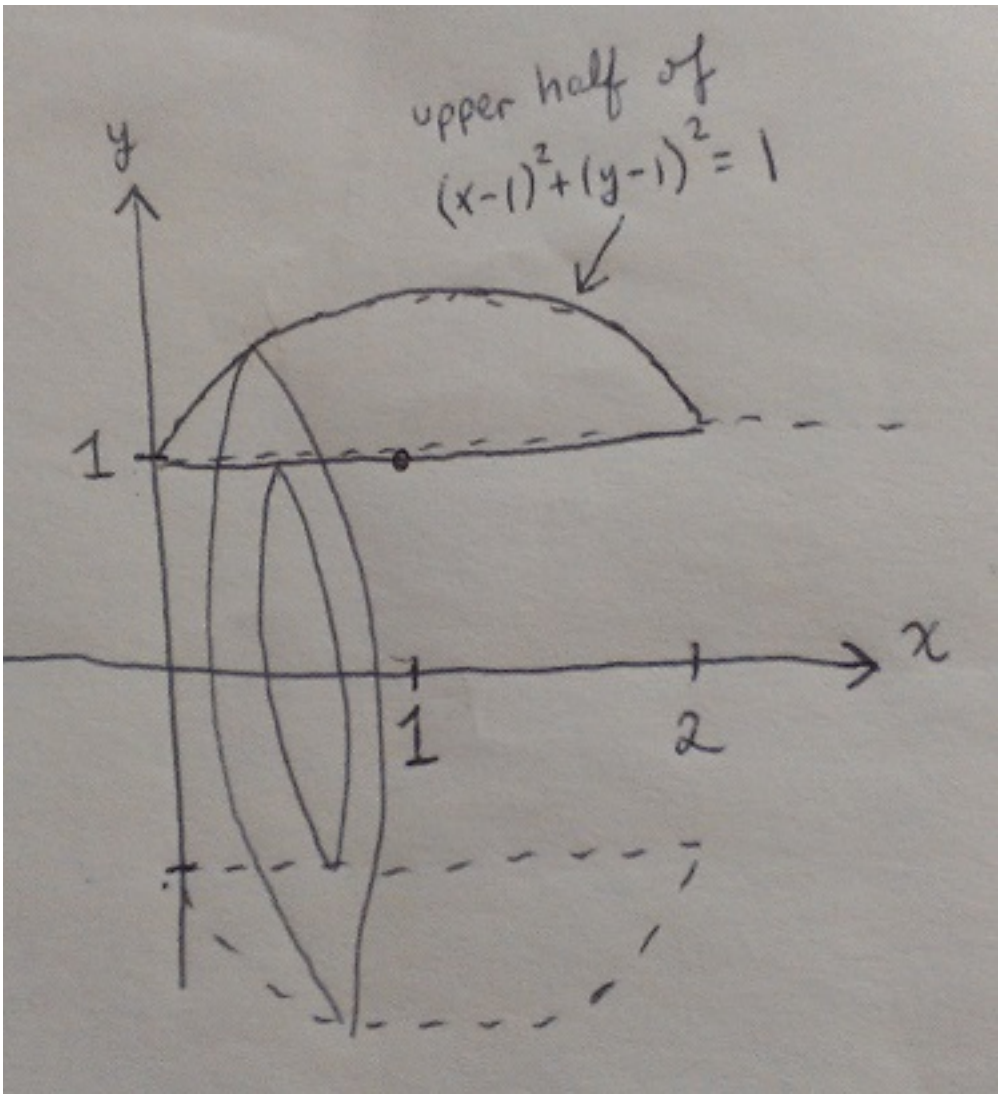
1. (*5 points*) Find the area between the line $y = 4x+1$ and the parabola $y = x^2 - 2$.



Solution:
We compute the x-coordinate of the intersection points by solving the equation $4x + 1 = x^2 - 2$. Its solutions are $x = 2 \pm \sqrt{7}$. Now from the picture it is clear that

$$\text{Area} = \int_{2-\sqrt{7}}^{2+\sqrt{7}} (4x + 1) - (x^2 - 2)dx = \frac{28\sqrt{7}}{3}.$$

2. (*5 points*) Let R be the region bounded by the line $y = 1$ and the upper semicircle of radius 1 centered at $(1, 1)$. **Set up but do not evaluate** an integral that will compute the volume of the solid of revolution obtained by rotating R about the x-axis.



Solution:

The described semicircle is given by the circle equation

$$(x-1)^2 + (y-1)^2 = 1.$$

Since we are doing a washer method and the integral will be dx we must write this equation with y in terms of x. If we solve the circle equation for y we get

$$y = \pm\sqrt{1-(x-1)^2} + 1.$$

We must take the positive solution here, so we have

$$y = \sqrt{1-(x-1)^2} + 1.$$

Therefore by the washer method,

$$\text{Vol} = \int_0^2 \pi \left(\left(\sqrt{1-(x-1)^2} + 1 \right)^2 - 1^2 \right) dx$$