



## Quiz 1



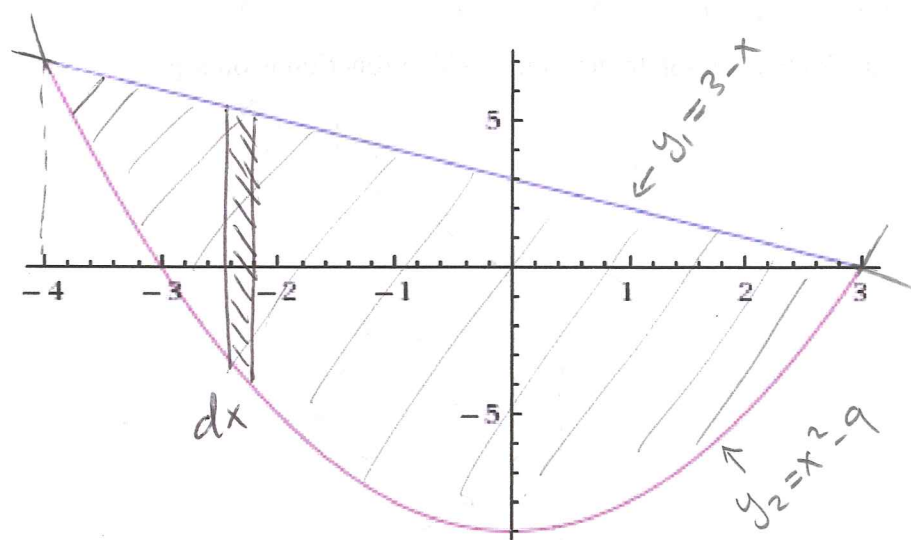
## MATH 172 Lab: Section 7

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Student's Name: Solution

Student's ID: \_\_\_\_\_

*Note: This quiz covers only the area between curves.***Show your work and circle your answers. Neatness and organization count!****Question 1:** (2 points) The figure below shows the graphs of  $y_1 = 3 - x$  and  $y_2 = x^2 - 9$  on the interval  $[-4, 3]$ .Give a formula for the area between  $y_1$  and  $y_2$  on  $[-4, 3]$ . **DO NOT EVALUATE THE INTEGRAL.****Hint:** You can write the area as either one integral or a sum of two integrals (both answers are correct).

$$3 - x = x^2 - 9$$

$$x^2 + x - 9 - 3 = 0$$

$$x^2 + x - 12 = 0$$

$$(x + 4)(x - 3) = 0$$

$$\boxed{x = -4} \text{ or } \boxed{x = 3}$$

$$A = \int_{-4}^3 [(3 - x) - (x^2 - 9)] dx$$

$$\text{or } A = \int_{-4}^0 [(3 - x) - (x^2 - 9)] dx + \int_0^3 [(3 - x) - (x^2 - 9)] dx$$

**Question 2:** Find the area bounded by the functions  $x = y^2$  and  $x = 2 - y^2$ .

- a. (1 point) Find where the curves intersect.

$$y^2 = 2 - y^2$$

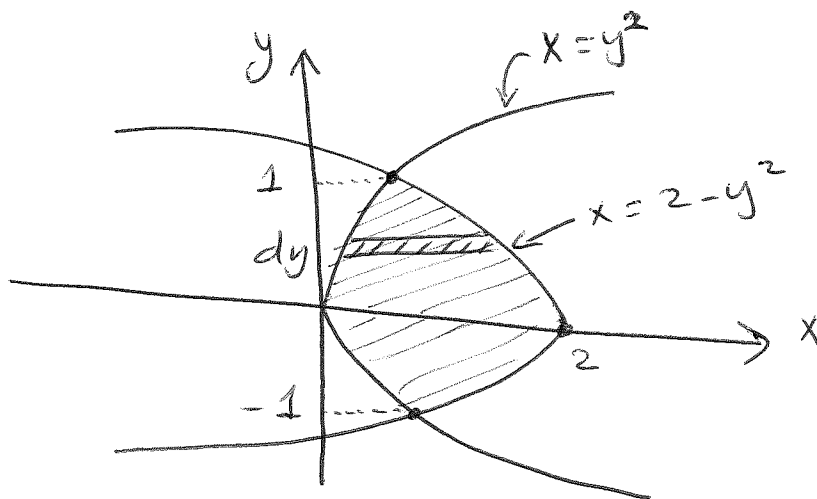
$$y^2 + y^2 = 2$$

~~$$2y^2 = 2$$~~

$$y^2 = 1 \Rightarrow \boxed{y = 1} \text{ or } \boxed{y = -1}$$

Thus, the curves intersect at  $(1, 1)$  and  $(1, -1)$

- b. (1 point) Sketch a graph to determine which function is on top.



- c. (1 point) Set up the integral and find the area between the curves.

$$A = \int_{-1}^1 (2 - y^2 - y^2) dy = 2y - \frac{y^3}{3} - \frac{y^3}{3} \Big|_{-1}^1$$

$$= 2y - \frac{2y^3}{3} \Big|_{-1}^1$$

$$= \left( 2(1) - \frac{2(1)^3}{3} \right) - \left( 2(-1) - \frac{2(-1)^3}{3} \right)$$

$$= \left( 2 - \frac{2}{3} \right) - \left( -2 + \frac{2}{3} \right) = \boxed{\frac{8}{3}}$$