



Quiz 1

MATH 172 Lab: Section 8

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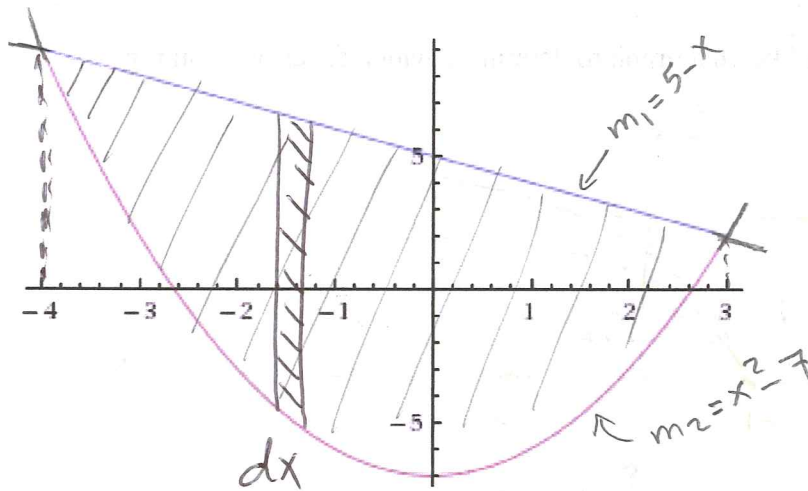
Student's Name: - Solution -

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 $m_1 = 5 - x$ and $m_2 = x^2 - 7$ on the interval $[-4, 3]$.



Give a formula for the area between m_1 and m_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).

$$5 - x = x^2 - 7$$

$$x^2 + x - 7 - 5 = 0$$

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

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

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

$$A = \int_{-4}^3 [(5 - x) - (x^2 - 7)] dx$$

$$\text{or } A = \int_{-4}^0 [(5 - x) - (x^2 - 7)] dx + \int_0^3 [(5 - x) - (x^2 - 7)] dx$$

Question 2: Find the area bounded by the functions $x = y^2 - 1$ and $x = 1 - y^2$.

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

$$y^2 - 1 = 1 - y^2$$

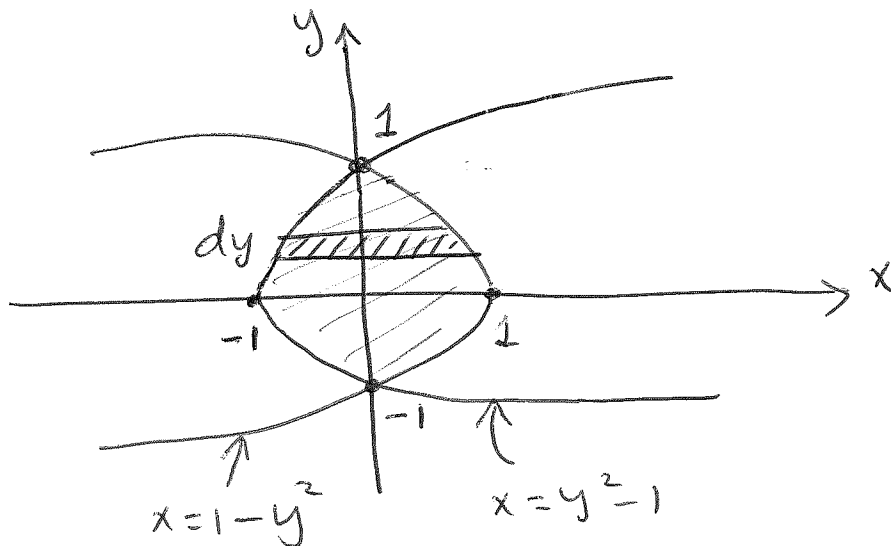
$$y^2 + y^2 = 1 + 1$$

$$2y^2 = 2$$

$$y^2 = 1$$

\Rightarrow $y = 1$ or $y = -1$ Thus, the curves intersect at $(0, 1)$ and $(0, -1)$

- 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.

$$A = \int_{-1}^1 [(1 - y^2) - (y^2 - 1)] dy = \int_{-1}^1 (1 - y^2 - y^2 + 1) dy =$$

$$= \int_{-1}^1 (2 - 2y^2) dy = \left[2y - \frac{2y^3}{3} \right]_{-1}^1 =$$

$$= \left(2(1) - \frac{2(1)^3}{3} \right) - \left(2(-1) - \frac{2(-1)^3}{3} \right) = \left(2 - \frac{2}{3} \right) - \left(-2 + \frac{2}{3} \right) = \boxed{\frac{8}{3}}$$