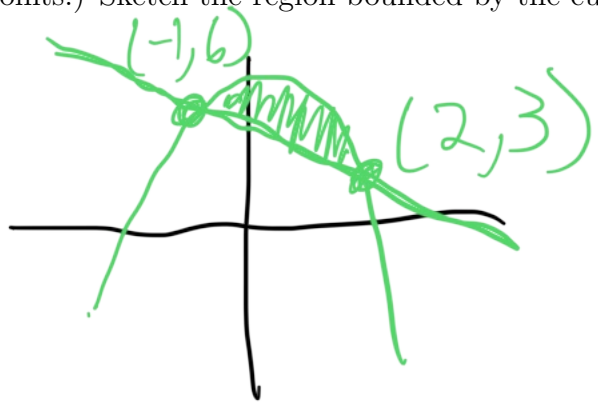
Name: _____ Quiz 2

Math F252X-902, Calculus II Spring 2025

Graded out of 22 points. No aids (book, notes, calculator, phone, etc.) are permitted. Show all work and use proper notation for full credit. Answers should be in reasonably simplified form.

1. Consider the curves $y = 5 - x$ and $y = 7 - x^2$.

   (a) (4 points.) Sketch the region bounded by the curves.



   (b) (6 points.) Find the area of the region bounded by the curves.

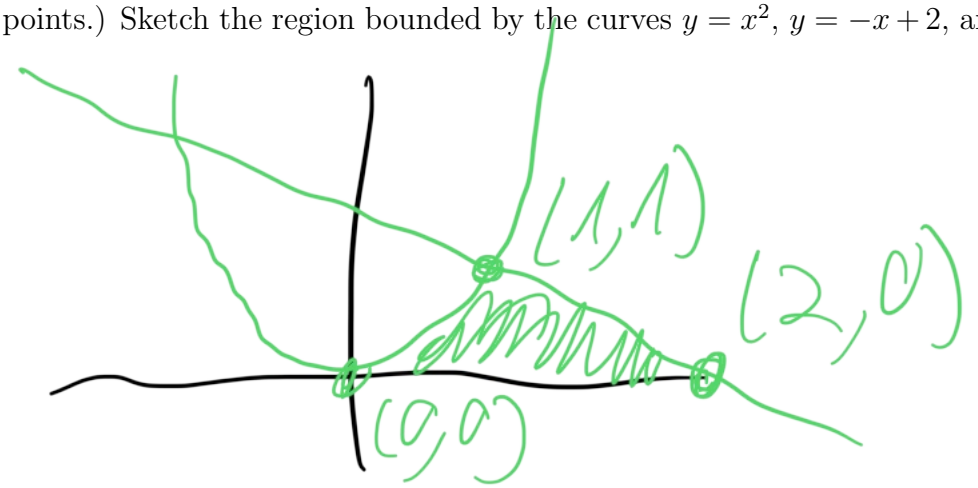
$$\int_{-1}^{2} (7-x^2) - (5-x)\,dx$$

$$\int_{-1}^{2} -x^2 + x + 2\,dx$$

$$-\frac{x^3}{3} + \frac{x^2}{2} + 2x \Big|_{-1}^{2}$$

$$\frac{9}{2}$$

2. (a) (4 points.) Sketch the region bounded by the curves $y = x^2$, $y = -x + 2$, and the x-axis.



(b) (4 points.) Set up an integral to find the volume of the solid of revolution obtained by rotating the region from part (a) about the x-axis. Do not evaluate the integral.

$$\pi \int_0^1 x^4\,dx + \pi \int_1^2 (-x+2)^2\,dx$$

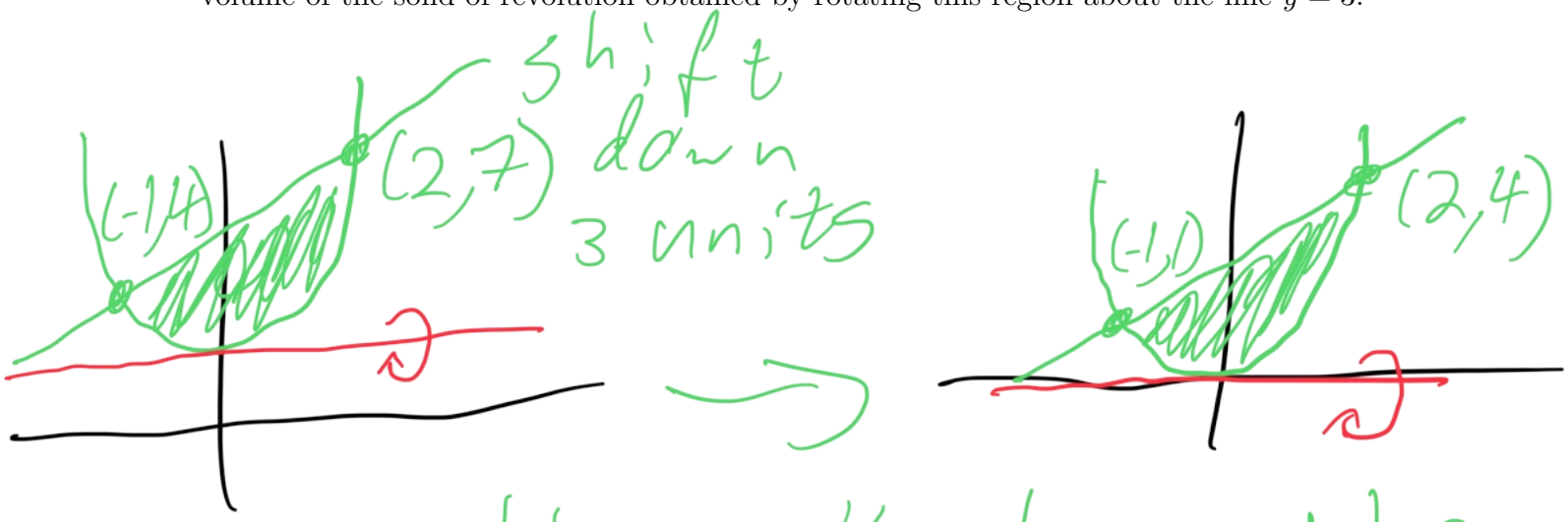
(c) (4 points.) Set up an integral to find the volume of the solid of revolution obtained by rotating the region from part (a) about the y-axis. Do not evaluate the integral.

$y = x^2 \rightarrow x = \sqrt{y}$

$y = -x + 2 \rightarrow x = -y + 2$

$$\pi \int_0^1 \left((-y+2)^2 - y\right)dy$$

3. BONUS (3 points.) Consider the region bounded by $y = x^2 + 3$ and $y = x + 5$. Find the volume of the solid of revolution obtained by rotating this region about the line $y = 3$.



This won't change the volume!

$$\pi \int_{-1}^{2} (x+2)^2 - (x^2)^2 \, dx$$

$$= \pi \int_{-1}^{2} x^2 + 4x + 4 - x^4$$

$$= \pi \left[\frac{x^3}{3} + 2x^2 + 4x - \frac{x^5}{5} \right]_{-1}^{2}$$

$$= \frac{72\pi}{5}$$