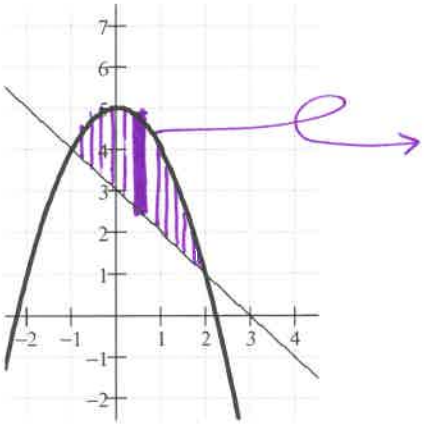
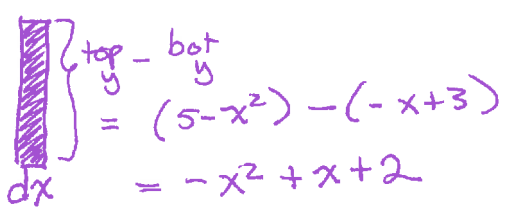
Math 252 Homework 8 Written Part **Name:** KEY

Write legibly. Show your work. Graph neatly. Use a ruler for all straight lines.

(1) Set up an integral that would find the area between the two curves $y = 5 - x^2$ (the bold line) and $y = -x + 3$ (the thin line). Follow the steps as given below.





a. Show (with algebra!) how to find the intersections of the two functions.

$y = 5 - x^2$ and $y = -x + 3$

so... $5 - x^2 = -x + 3$

$0 = x^2 - x - 2$

$0 = (x-2)(x+1)$

$\Rightarrow x = 2, -1$

$x = 2$	$x = -1$
$y = 5 - 4 = 1$	$y = 1 - 4 = -3$
$(2, 1)$	$(-1, -3)$

b. On the graph above, draw and label your representative rectangle. Explain why you chose either vertical or horizontal rectangles.

I chose vertical rectangles so that I would always have the same function on the top, and the same function on the bottom, of each rectangle.

c. Set up the integral that will find the area between the curves. Simplify.

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

d. Finally, show how to solve the integral. Compare to the graph to see if your final answer is reasonable.

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

$$= \left[-\frac{8}{3} + 2 + 4\right] - \left[\frac{1}{3} + \frac{1}{2} - 2\right]$$

$$= \frac{10}{3} + \frac{7}{6} = \frac{27}{6} = \frac{9}{2} = 4.5$$

Seems about right!