

6.1 examples

Sunday, December 16, 2018 9:00 PM



6.1 examples

Calculus AB: Area Between Two Curves (6.1)

Example 1

$$\int (f(x) - g(x)) dx$$

Calculate the area of the region between the graphs of $f(x) = x^2 - 4x + 10$ and $g(x) = 4x - x^2$ on the interval $[1, 3]$.

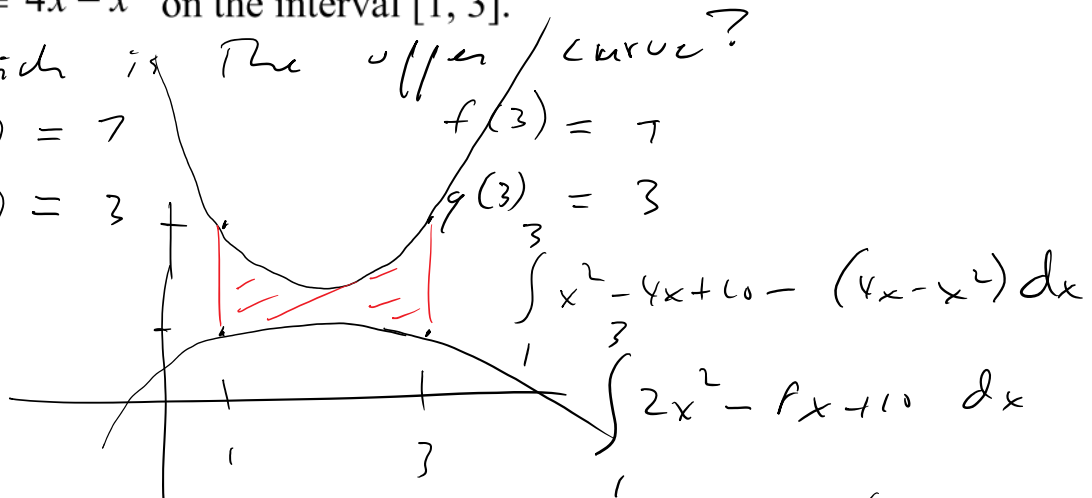
Which is the upper curve?

$$f(1) = 7$$

$$f(3) = 7$$

$$g(1) = 3$$

$$g(3) = 3$$



$$\int_1^3 (x^2 - 4x + 10 - (4x - x^2)) dx$$

$$\int_1^3 (2x^2 - 8x + 10) dx$$

$$\left. \left(\frac{2}{3}x^3 - 4x^2 + 10x \right) \right|_1^3 = 18 - 36 + 30 - \left(\frac{2}{3} - 4 + 10 \right)$$

$$12 - \left(\frac{2}{3} \right) = \frac{34}{3}$$

Example 2

Find the area between the graphs of $f(x) = x^2 - 5x - 7$ and $g(x) = x - 12$ over $[-2, 5]$.

$$x^2 - 5x - 7 = x - 12$$

$$x^2 - 6x + 5 = 0$$

$$(x-1)(x-5) = 0$$

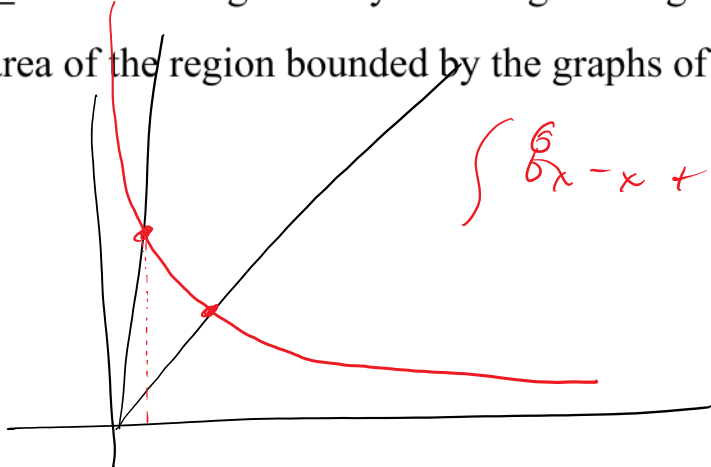
$$x = 1, 5$$

$$f(0) = -7 \quad g(0) = -12$$

$$\int_{-2}^1 (x^2 - 5x - 7) - (x - 12) dx + \int_1^5 (x - 12) - (x^2 - 5x - 7) dx$$

Example 3 – Calculating Area by Dividing the Region

Find the area of the region bounded by the graphs of $y = \frac{8}{x^2}$, $y = 8x$ and $y = x$.



$$\int_1^4 8x - x + \int_2^4 \frac{8}{x^2} - x$$

379; 4, 25, 26

Example 4

Calculate the area between the graphs of $g_1(y) = y^3 - 4y$ and $g_2(y) = y^3 + y^2 + 8$ for $-2 \leq y \leq 2$

x	y
0	0
8	0

Do they intersect?

$$y^3 - 4y = y^3 + y^2 + 8$$

$$0 = y^2 + 4y + 8$$

$$\sqrt{b^2 - 4ac}$$
$$\sqrt{16 - 4(1)(8)}$$

$$\int_{-2}^2 (y^3 + y^2 + 8 - (y^3 - 4y)) dy$$

$$\int_{-2}^2 (y^2 + 4y + 8) dy$$

366: 18-21

379: 1-3