6.1 examples

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6.1 examples

Calculus AB: Area Between Two Curves (6.1)

Example 1

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].

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

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

Example 2

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

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

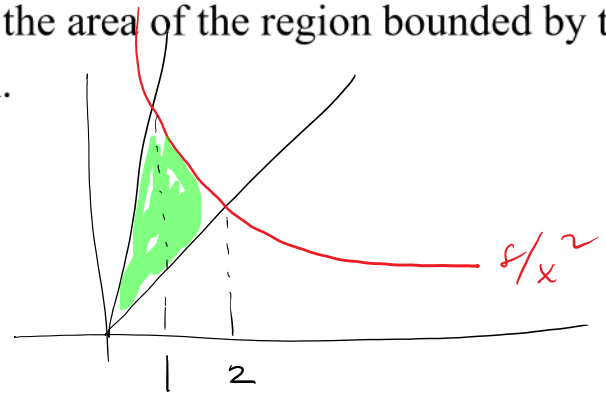
$x^2 - 6x + 5 = 0$

$(x-1)(x-5) = 0 \quad x = 1, 5$

$$\int_{-2}^{1} f(x) - g(x)\,dx + \int_{1}^{5} g(x) - f(x)\,dx$$

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 $y = x$.



$\frac{8}{x^2} = 8x$

$\frac{8}{x^2} = x$

$$\int_0^1 8x - x \, dx + \int_1^2 \frac{8}{x^2} - x \, dx$$

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 $-2 \le y \le 2$

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

$$= 37.\overline{3}$$

379: 14, 15, 16, 24, 25, 26

379: 1-3

(19) $y = 3x^5 + 10x^4$

$y' = 15x^4 + 40x^3$

$y'' = 60x^3 + 120x^2 = 0$

$60x^2(x+2) = 0$

(B)

↑ no sign change in y''

↖ sign change at $x = -2$

(20) $\lim_{x \to 2} \dfrac{\ln(x+3) - \ln(5)}{x-2}$ $\dfrac{0}{0}$

$\xrightarrow{LR}$ $\dfrac{\frac{1}{x+3}}{1}$ $\longrightarrow$ $\dfrac{1}{5}$ (B)