

Chapter 4

Indefinite Integrals

Solving differential equations (general and particular)

Definite integral properties

Evaluating a definite integral geometrically

Estimating area under a curve (left, right, m.p. trap.)

Evaluating a definite integral with 1st F.T.C.

2nd F.T.C.

Finding area under a curve with 1st F.T.C.

Average value

U-substitution

$$\textcircled{1} \int (2x-1)(x+4) dx$$

$$\int (2x^2 + 7x - 4) dx$$

$$\frac{2x^3}{3} + \frac{7x^2}{2} - 4x + C$$

$$\textcircled{2} \int \frac{x^4 - x}{x} dx$$

$$\int \frac{\cancel{x}(x^3 - 1)}{\cancel{x}} dx$$

$$\int (x^3 - 1) dx$$

$$\frac{x^4}{4} - x + C$$

Find the general solution to the differential equation. $+C$

$$\frac{dy}{dx} = \cos x - \sin x$$

$$y = \sin x + \cos x + C$$

Solve the differential equation.

$$f'(x) = 2x - 1 \quad (2, 5)$$

$$f(x) = x^2 - x + C$$

$$5 = 4 - 2 + C$$

$$3 = C$$

$$f(x) = x^2 - x + 3$$

$$\int_2^7 f(x) dx = 11$$

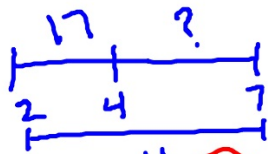
$$\int_2^4 f(x) dx = 17$$

$$5x \Big|_2^4$$

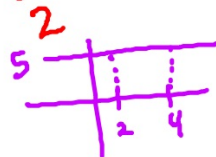
$$\textcircled{1} \int_7^2 f(x) dx = -11$$

$$\textcircled{2} \int_2^4 3f(x) dx = 3 \cdot 17 = 51$$

$$\textcircled{3} \int_4^7 f(x) dx = -6$$

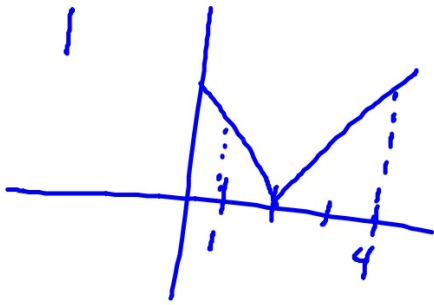


$$\textcircled{4} \int_2^4 (f(x) + 5) dx = \int_2^4 f(x) dx + \int_2^4 5 dx$$



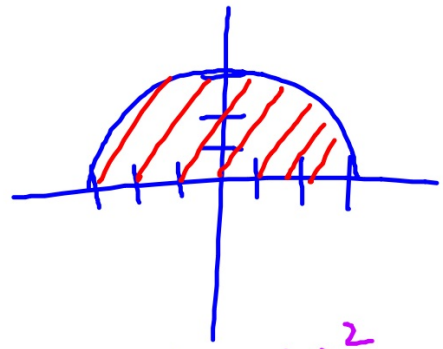
$$= 17 + 10 = 27$$

$$\int_1^4 |x-2| dx$$



$$\frac{1}{2}(1)(1) + \frac{1}{2}(2)(2)$$
$$\frac{1}{2} + 2 = 2\frac{1}{2}$$

$$\int_{-3}^3 \sqrt{9-x^2} dx$$



$$\frac{1}{2}\pi(3)^2$$
$$\frac{9\pi}{2}$$