

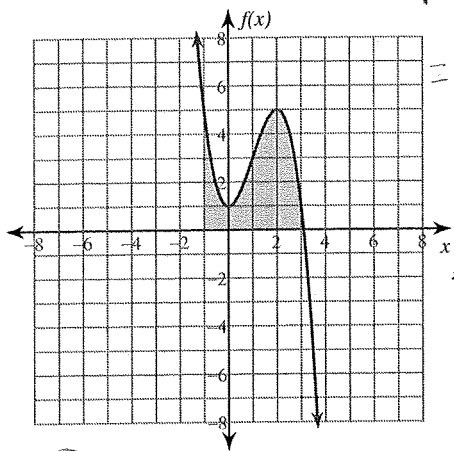
Fundamental Theorem of Calculus

Evaluate each definite integral.

1-8 only

$$1) \int_{-1}^3 (-x^3 + 3x^2 + 1) dx = -\frac{x^4}{4} + \frac{3x^3}{3} + x \Big|_{-1}^3$$

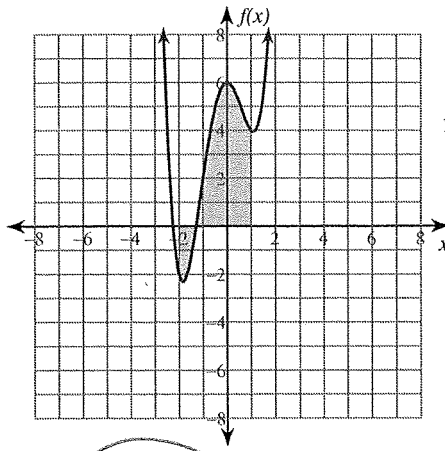
$$2) \int_{-2}^1 (x^4 + x^3 - 4x^2 + 6) dx = \frac{x^5}{5} + \frac{x^4}{4} - \frac{4}{3}x^3 + 6x \Big|_{-2}^1$$



$$= -\frac{x^4}{4} + x^3 + x \Big|_{-1}^3$$

$$= 9.75 - 2.25$$

$$= 12$$



$$= 5.116 - 3.73$$

$$= 8.85$$

12

$\frac{177}{20} = 8.85$

$$3) \int_1^3 (2x^2 - 12x + 13) dx = \frac{2}{3}x^3 - 6x^2 + 13x \Big|_1^3$$

$$4) \int_0^3 (-x^3 + 3x^2 - 2) dx = -\frac{x^4}{4} + x^3 - 2x \Big|_0^3$$

$\frac{14}{3} \approx -4.667$

$\frac{3}{4} = 0.75$

$$5) \int_{-1}^0 (x^5 - 4x^3 + 4x + 4) dx = \frac{x^6}{6} - x^4 + 2x^2 + 4x \Big|_{-1}^0$$

$$6) \int_{-3}^0 4x^{\frac{1}{3}} dx = \frac{4x^{\frac{4}{3}}}{\frac{4}{3}} \Big|_{-3}^0$$

$$= \frac{4x^{\frac{4}{3}}}{\frac{4}{3}} \Big|_{-3}^0$$

$$= 3x^{\frac{4}{3}} \Big|_{-3}^0$$

$\frac{17}{6} \approx 2.833$

$-9\sqrt[3]{3} \approx -12.98$

$$7) \int_{-4}^{-1} -\frac{4}{x^3} dx = \int_{-4}^{-1} -4x^{-3} dx$$

$$\frac{15}{8} = 1.875$$

$$\frac{-4x^{-2}}{-2} = \frac{2}{x^2} \Big|_{-4}^{-1} = 2 - \frac{1}{8}$$

Stop

$$\left(\frac{15}{8} \right)$$

$$9) \int_{-\frac{\pi}{4}}^{-\frac{\pi}{6}} 2\cos x dx$$

$$-1 + \sqrt{2} \approx 0.414$$

$$11) \int_{-3}^{-2} 5(2x+4)^{\frac{1}{3}} dx$$

$$-\frac{15\sqrt[3]{2}}{4} \approx -4.725$$

$$13) \int_{-1}^1 e^{2x-2} dx$$

$$\frac{e^4 - 1}{2e^4} \approx 0.491$$

$$15) \int_0^3 f(x) dx, f(x) = \begin{cases} \frac{x}{2} - 1, & x \leq 2 \\ x^2 - 6x + 8, & x > 2 \end{cases}$$

$$-\frac{5}{3} \approx -1.667$$

$$8) \int_{-3}^{-1} \frac{4}{x} dx = 4 \int_{-3}^{-1} \frac{1}{x} dx = 4 \ln x \Big|_{-3}^{-1}$$

$$-4 \ln 3 \approx -4.394$$

$$= 4 [\ln(-1) - \ln(-3)] \\ = 4 \ln \frac{1}{3} = 4 \ln \frac{1}{3} \\ = 4 \ln 3^{-1} = -4 \ln 3$$

$$10) \int_{\sqrt{2}}^2 \frac{1}{x\sqrt{x^2-1}} dx$$

$$\frac{\pi}{12} \approx 0.262$$

$$12) \int_{-1}^2 \frac{2}{(2x+4)^3} dx$$

$$\frac{15}{128} \approx 0.117$$

$$14) \int_{-4}^{-2} (-x + |-3x-9|) dx$$

$$9$$

$$16) \int_{-5}^1 -|x^2 + 4x| dx$$

$$-\frac{46}{3} \approx -15.333$$