Calculus Practice: First Fundamental Theorem of Calculus 5b

Evaluate each definite integral.

1) $\int_{1}^{7} f(x)\,dx,\ f(x) = \begin{cases} \frac{x}{2} + \frac{1}{2}, & x \le 3 \\ -\frac{x}{2} + \frac{7}{2}, & x > 3 \end{cases}$

2) $\int_{-4}^{3} f(x)\,dx,\ f(x) = \begin{cases} 2, & x < 2 \\ \frac{x}{2} + 1, & x \ge 2 \end{cases}$

3) $\int_{0}^{2} f(x)\,dx,\ f(x) = \begin{cases} -x - 2, & x \le 1 \\ -2x - 1, & x > 1 \end{cases}$

4) $\int_{-6}^{5} f(x)\,dx,\ f(x) = \begin{cases} -x - 2, & x < -1 \\ -\frac{x}{2} - \frac{3}{2}, & x \ge -1 \end{cases}$

5) $\int_{-1}^{2} \left(x + |x|\right) dx$

6) $\int_{-4}^{-1} \left(-x + |-3x - 9|\right) dx$

7) $\int_{-2}^{1} \left(-x + |-3x - 3|\right) dx$

8) $\int_{-3}^{0} \left(-x + |x + 2|\right) dx$

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

10) $\int_{0}^{5} f(x)\,dx,\ f(x) = \begin{cases} 2x + 1, & x < 1 \\ x^2 - 6x + 8, & x \ge 1 \end{cases}$

11) $\int_{-1}^{4} f(x)\,dx,\ f(x) = \begin{cases} -2x, & x < 1 \\ -x^2 + 4x - 5, & x \ge 1 \end{cases}$

12) $\int_{-3}^{3} f(x)\,dx,\ f(x) = \begin{cases} x^2 + 2x + 2, & x \le -1 \\ -2x - 1, & x > -1 \end{cases}$

13) $\int_{-1}^{5} -\left|x^2 - 4x\right|\,dx$

14) $\int_{-2}^{3} -\left|x^2 - x\right|\,dx$

15) $\int_{-1}^{6} -\left|x^2 - 5x\right|\,dx$

16) $\int_{-1}^{4} -\left|x^2 - 3x\right|\,dx$

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2) $\int_{-4}^{3} f(x)\,dx,\ f(x) = \begin{cases} 2, & x < 2 \\ \frac{x}{2} + 1, & x \ge 2 \end{cases}$

$\frac{57}{4} = 14.25$

3) $\int_{0}^{2} f(x)\,dx,\ f(x) = \begin{cases} -x - 2, & x \le 1 \\ -2x - 1, & x > 1 \end{cases}$

$-\frac{13}{2} = -6.5$

4) $\int_{-6}^{5} f(x)\,dx,\ f(x) = \begin{cases} -x - 2, & x < -1 \\ -\frac{x}{2} - \frac{3}{2}, & x \ge -1 \end{cases}$

$-\frac{15}{2} = -7.5$

5) $\int_{-1}^{2} \left(x + |x|\right) dx$

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6) $\int_{-4}^{-1} \left(-x + |-3x - 9|\right) dx$

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$\frac{97}{12} \approx 8.083$

10) $\int_{0}^{5} f(x)\,dx,\ f(x) = \begin{cases} 2x + 1, & x < 1 \\ x^2 - 6x + 8, & x \ge 1 \end{cases}$

$\frac{10}{3} \approx 3.333$

11) $\int_{-1}^{4} f(x)\,dx,\ f(x) = \begin{cases} -2x, & x < 1 \\ -x^2 + 4x - 5, & x \ge 1 \end{cases}$

-6

12) $\int_{-3}^{3} f(x)\,dx,\ f(x) = \begin{cases} x^2 + 2x + 2, & x \le -1 \\ -2x - 1, & x > -1 \end{cases}$

$-\frac{22}{3} \approx -7.333$

13) $\int_{-1}^{5} -\left|x^2 - 4x\right|\,dx$

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

14) $\int_{-2}^{3} -\left|x^2 - x\right|\,dx$

$-\frac{19}{2} = -9.5$

15) $\int_{-1}^{6} -\left|x^2 - 5x\right|\,dx$

$-\frac{53}{2} = -26.5$

16) $\int_{-1}^{4} -\left|x^2 - 3x\right|\,dx$

$-\frac{49}{6} \approx -8.167$