Integration Test Review

For each problem, approximate the area under the curve over the given interval using 4 midpoint rectangles.

1) $y = \dfrac{x^2}{2} + x + 2$; $[-2, 2]$

For each problem, approximate the area under the curve over the given interval using 3 trapezoids.

2) $y = -x^2 + 2x + 11$; $[-10, 2]$

For each problem, use a left-hand Riemann sum to approximate the integral based off of the values in the table.

3) $\displaystyle\int_0^{35} g(x)\,dx$

x	0	18	22	25	35
$g(x)$	9	7	2	−1	−5

For each problem, use a right-hand Riemann sum to approximate the integral based off of the values in the table.

4) $\displaystyle\int_0^{29} f(w)\,dw$

w	0	3	12	28	29
$f(w)$	0	3	4	3	1

Answers

Integration Test Review

For each problem, approximate the area under the curve over the given interval using 4 midpoint rectangles.

1) $y = \dfrac{x^2}{2} + x + 2; \ [-2, 2]$

$\dfrac{21}{2} = 10.5$

For each problem, approximate the area under the curve over the given interval using 3 trapezoids.

2) $y = -x^2 + 2x + 11; \ [-10, 2]$

-332

For each problem, use a left-hand Riemann sum to approximate the integral based off of the values in the table.

3) $\displaystyle\int_{0}^{35} g(x)\, dx$

x	0	18	22	25	35
$g(x)$	9	7	2	−1	−5

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For each problem, use a right-hand Riemann sum to approximate the integral based off of the values in the table.

4) $\displaystyle\int_{0}^{29} f(w)\, dw$

w	0	3	12	28	29
$f(w)$	0	3	4	3	1

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Evaluate each indefinite integral.

5) $\int \left(12x^3 + 9x^2 + 6x\right) dx$

6) $\int 2x\left(15x^4 - 2x^2 - 3\right) dx$

7) $\int \left(-\dfrac{5}{x^2} - \dfrac{10}{x^3}\right) dx$

8) $\int \left(\dfrac{5\sqrt[3]{x^2}}{3} - \dfrac{8}{x^3}\right) dx$

9) $\int \left(24x^5 + \dfrac{20\sqrt[3]{x^2}}{3} + \dfrac{9}{x^4}\right) dx$

10) $\int 4\csc x \cot x \, dx$

11) $\int 4\cos x \, dx$

12) $\int -4\sec^2 x \, dx$

13) $\int 3 \cdot 5^x \, dx$

14) $\int -2x^{-1} \, dx$

Answers

Evaluate each indefinite integral.

5) $\displaystyle\int \left(12x^3 + 9x^2 + 6x\right) dx$

$3x^4 + 3x^3 + 3x^2 + C$

6) $\displaystyle\int 2x\left(15x^4 - 2x^2 - 3\right) dx$

$5x^6 - x^4 - 3x^2 + C$

7) $\displaystyle\int \left(-\dfrac{5}{x^2} - \dfrac{10}{x^3}\right) dx$

$\dfrac{5}{x} + \dfrac{5}{x^2} + C$

8) $\displaystyle\int \left(\dfrac{5\sqrt[3]{x^2}}{3} - \dfrac{8}{x^3}\right) dx$

$x^{\frac{5}{3}} + \dfrac{4}{x^2} + C$

9) $\displaystyle\int \left(24x^5 + \dfrac{20\sqrt[3]{x^2}}{3} + \dfrac{9}{x^4}\right) dx$

$4x^6 + 4x^{\frac{5}{3}} - \dfrac{3}{x^3} + C$

10) $\displaystyle\int 4\csc x\cot x \, dx$

$-4\csc x + C$

11) $\displaystyle\int 4\cos x \, dx$

$4\sin x + C$

12) $\displaystyle\int -4\sec^2 x \, dx$

$-4\tan x + C$

13) $\displaystyle\int 3 \cdot 5^x \, dx$

$\dfrac{3 \cdot 5^x}{\ln 5} + C$

14) $\displaystyle\int -2x^{-1} \, dx$

$-2\ln\left|x\right| + C$

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15) $\int e^x \, dx$

16) $\int \dfrac{5}{\sqrt{1-x^2}} \, dx$

17) $\int \dfrac{7}{1+x^2} \, dx$

18) $\int \dfrac{3\sin x}{\cos^2 x} \, dx$

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Answers

15) $\int e^x\, dx$

$e^x + C$

16) $\int \dfrac{5}{\sqrt{1-x^2}}\, dx$

$5\sin^{-1} x + C$

17) $\int \dfrac{7}{1+x^2}\, dx$

$7\tan^{-1} x + C$

18) $\int \dfrac{3\sin x}{\cos^2 x}\, dx$

$3\sec x + C$

Evaluate each definite integral.

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

20) $\displaystyle\int_{27}^{8} 4x^{\frac{1}{3}} dx$

21) $\displaystyle\int_{1}^{2} \frac{5}{x} dx$

22) $\displaystyle\int_{1}^{3} \frac{2}{x^2} dx$

23) $\displaystyle\int_{-\frac{5\pi}{6}}^{-\frac{\pi}{2}} \sin x \, dx$

24) $\displaystyle\int_{\sqrt{3}}^{\frac{\sqrt{3}}{3}} \frac{9}{1+x^2} dx$

25) $\displaystyle\int_{-4}^{1} \left(3x + \left|2x + 2\right|\right) dx$

26) $\displaystyle\int_{-2}^{3} f(x)\, dx,\ f(x) = \begin{cases} -2x + 1, & x < 1 \\ x^2 - 2x, & x \geq 1 \end{cases}$

Answers

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

4

20) $\int_{27}^{8} 4x^{\frac{1}{3}} dx$

-195

21) $\int_{1}^{2} \frac{5}{x} dx$

$5 \ln 2 \approx 3.466$

22) $\int_{1}^{3} \frac{2}{x^2} dx$

$\frac{4}{3} \approx 1.333$

23) $\int_{-\frac{5\pi}{6}}^{-\frac{\pi}{2}} \sin x \, dx$

$-\frac{\sqrt{3}}{2} \approx -0.866$

24) $\int_{\sqrt{3}}^{\frac{\sqrt{3}}{3}} \frac{9}{1 + x^2} dx$

$-\frac{3\pi}{2}$

25) $\int_{-4}^{1} \left(3x + |2x + 2|\right) dx$

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

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

$\frac{20}{3} \approx 6.667$

For each problem, find $F'(x)$.

27) $F(x) = \displaystyle\int_{-1}^{x} 3e^t \, dt$

28) $F(x) = \displaystyle\int_{-\frac{\pi}{6}}^{3x} -2\sec t\tan t \, dt$

29) $F(x) = \displaystyle\int_{x}^{x^2} \frac{4}{(t-2)^3} \, dt$

Answers

For each problem, find $F'(x)$.

27) $F(x) = \displaystyle\int_{-1}^{x} 3e^t \, dt$

$F'(x) = 3e^x$

28) $F(x) = \displaystyle\int_{-\frac{\pi}{6}}^{3x} -2\sec t\tan t \, dt$

$F'(x) = -6\sec 3x\tan 3x$

29) $F(x) = \displaystyle\int_{x}^{x^2} \frac{4}{(t-2)^3} \, dt$

$F'(x) = \dfrac{8x}{(x^2-2)^3} - \dfrac{4}{(x-2)^3}$

For each problem, find the average value of the function over the given interval.

30) $f(x) = x^3 - 3x^2 + 6;\ [-1, 2]$

Answers

For each problem, find the average value of the function over the given interval.

30) $f(x) = x^3 - 3x^2 + 6; \ [-1, 2]$

$\dfrac{17}{4} = 4.25$