

# Integration Test ... Set 1

## Integration Test Review

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

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

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

$x$	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)  $\int_0^{29} f(w) dw$

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

# Integration Test ... Set 1

## Answers

### Integration Test Review

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

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

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

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

$x$	0	18	22	25	35
$g(x)$	9	7	2	-1	-5

$$186$$

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

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

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

$$94$$

# Integration Test ... Set 1

Evaluate each indefinite integral.

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

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

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

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

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

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

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

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

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

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

# Integration Test ... Set 1

## Answers

Evaluate each indefinite integral.

$$5) \int (12x^3 + 9x^2 + 6x) dx$$
$$3x^4 + 3x^3 + 3x^2 + C$$

$$6) \int 2x(15x^4 - 2x^2 - 3) dx$$
$$5x^6 - x^4 - 3x^2 + C$$

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

$$8) \int \left( \frac{5\sqrt[3]{x^2}}{3} - \frac{8}{x^3} \right) dx$$
$$x^{\frac{5}{3}} + \frac{4}{x^2} + C$$

$$9) \int \left( 24x^5 + \frac{20\sqrt[3]{x^2}}{3} + \frac{9}{x^4} \right) dx$$
$$4x^6 + 4x^{\frac{5}{3}} - \frac{3}{x^3} + C$$

$$10) \int 4\csc x \cot x dx$$
$$-4\csc x + C$$

$$11) \int 4\cos x dx$$
$$4\sin x + C$$

$$12) \int -4\sec^2 x dx$$
$$-4\tan x + C$$

$$13) \int 3 \cdot 5^x dx$$
$$\frac{3 \cdot 5^x}{\ln 5} + C$$

$$14) \int -2x^{-1} dx$$
$$-2\ln |x| + C$$

## Integration Test ... Set 1

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

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

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

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

# Integration Test ... Set 1

## Answers

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

$$e^x + C$$

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

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

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

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

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

$$3\sec x + C$$

# Integration Test ... Set 1

Evaluate each definite integral.

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

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

$$21) \int_1^2 \frac{5}{x} dx$$

$$22) \int_1^3 \frac{2}{x^2} dx$$

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

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

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

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

# Integration Test ... Set 1

## Answers

Evaluate each definite integral.

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

$4$

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

$-195$

$$21) \int_1^2 \frac{5}{x} dx$$

$5 \ln 2 \approx 3.466$

$$22) \int_1^3 \frac{2}{x^2} dx$$

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

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

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

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

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

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

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

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

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



## Integration Test ... Set 1

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

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

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

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

# Integration Test ... Set 1

## Answers

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

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

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

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

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

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

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

## Integration Test ... Set 1

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

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

# Integration Test ... Set 1

## Answers

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

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

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