

# AP Calculus Review 4.1-4.4

Evaluate each definite integral.

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

2)  $\int_{-2}^1 (x^4 + x^3 - 4x^2 + 6) dx$

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

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

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

6)  $\int_{-1}^3 |4x - 1| dx$

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

1)  $y = \frac{x^2}{2} + x + 2$ ;  $[-5, 3]$

2)  $y = x^2 + 3$ ;  $[-3, 1]$

For each problem, approximate the area under the curve over the given interval using 5 right endpoint rectangles. You may use the provided graph to sketch the curve and rectangles.

3)  $y = -\frac{x^2}{2} + 6$ ;  $[-3, 2]$

4)  $y = -\frac{x^2}{2} + x + 5$ ;  $[-1, 4]$

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

1)  $f(x) = -x^2 - 2x + 5$ ;  $[-4, 0]$

2)  $f(x) = -x^4 + 2x^2 + 4$ ;  $[-2, 1]$

For each problem, find the values of  $c$  that satisfy the Mean Value Theorem for Integrals.

3)  $f(x) = -\frac{x^2}{2} + x + \frac{3}{2}$ ;  $[-3, 1]$

4)  $f(x) = \frac{4}{x^2}$ ;  $[-4, -2]$



Solve the differential equation

$$1) f''(x) = 4x \quad f'(2) = 5 \quad f(2) = 12$$

Find  $F(x)$

$$1) F(x) = \int_{-2}^x \sqrt{3t^2 + 1} dt$$

$$2) F(x) = \int_3^{-2x^4} (5t - 2) dt$$

$$3) F(x) = \int_{4x^3}^2 (2t + 1) dt$$