

Problem 1. Find the most general antiderivative of the following functions.

1. * $f(x) = 4\sqrt{x} - 6x^2 + 3.$

2. $f(x) = \cos x + 2 \sec^2 x.$

3. $g(t) = \frac{1+t+t^2}{\sqrt{t}}.$

4. $f(x) = \frac{5 - 4x^3 + 2x^6}{x^6}.$

Problem 2. Find f satisfying the following conditions.

1. * $f'(x) = (x+1)/\sqrt{x}, f(1) = 5.$

2. $f''(\theta) = \sin \theta + \cos \theta, f(0) = 3, f'(0) = 4.$

3. $f'''(x) = \cos x, f(0) = 1, f'(0) = 2, f''(0) = 3.$

4. $f'(t) = 2t - 3 \sin t, f(0) = 5.$

Problem 3. Give an expression of the area under the graph of f as a limit of a sum. Do not evaluate the limit.

1. * $f(x) = \frac{2x}{x^2 + 1}, 1 \leq x \leq 3.$

2. $f(x) = x^2 + \sqrt{1+2x}, 4 \leq x \leq 7.$

3. $f(x) = \sqrt{\sin x}, 0 \leq x \leq \pi.$

* **Problem 4.** Evaluate the area under the graph of the function $y = x, 0 \leq x \leq 1$ by expressing it as a limit of a sum and then evaluating the limit you obtain.