1 Exercises

1. Compute the derivatives of the following functions:
$$\sin(3x), \quad e^{2x}, \quad e^{3x-1}, \quad 3x^2 + 5x^3, \quad \frac{1}{x^3}, \quad \frac{1}{(3x)^3}, \quad \frac{1}{\sqrt[5]{x}}, \quad \frac{1}{\sqrt[5]{(3x)}}, \quad \sin(3x) + \frac{1}{x^3} + \frac{1}{\sqrt[5]{(3x)}}.$$

2. Compute the derivatives of the following functions:
$$\sin(x)e^{3x}, \quad \sin(x^2), \quad \ln x \sin(x^2), \quad \frac{\sin(x)}{e^{3x}}.$$

3. Compute the indefinite integrals of the following functions:
$$\sin(3x), \quad e^{2x}, \quad e^{3x-1}, \quad 3x^2 + 5x^3, \quad \frac{1}{x^3}, \quad \frac{1}{(3x)^3}, \quad \frac{1}{\sqrt[5]{x}}, \quad \frac{1}{\sqrt[5]{(3x)}},$$

4. Compute the indefinite integrals of the following functions:
$$\sin(x)x, \quad e^{3x}x, \quad \cos(2x)x,$$

5. Find the general solutions of the following differential equations:
$$y'(t) = 3, \quad y'(t) = 3x, \quad y'(t) = 3x + 1, \quad y'(t) = e^x, \quad y'(t) = x^2, \quad y'(t) = (5x)^2, \quad y'(t) = \sin(3x).$$

6. Find the particular solutions of the following differential equations:
$$y'(t) = 3, \quad y'(t) = 3x, \quad y'(t) = 3x + 1, \quad y'(t) = e^x, \quad y'(t) = x^2, \quad y'(t) = (5x)^2, \quad y'(t) = \sin(3x)$$

if $y(1) = 2$.

2 Sample

1. Compute the derivatives of the following function:
$$\sin(3x) + \frac{1}{x^3} + \frac{1}{\sqrt[5]{(3x)}}$$

2. Compute the indefinite integral of the following function:
$$e^{3x-1}$$

3. Find the general solutions of the following differential equation:
$$y'(t) = 3x + 1$$

4. Find the particular solution of the following differential equation:
$$y'(t) = 3x + 1, \quad y(1) = 2.$$