

Symbolic Integration Assignment

Author Aaron Tresham

Date 2017-06-09T20:04:17

Project a8975d68-235e-4f21-8635-2051d699f504

Location [14 - Symbolic Integration Assignment/Symbolic Integration Assignment.sagews](#)

Original file [Symbolic Integration Assignment.sagews](#)

Symbolic Integration Assignment

Question 0

Watch the lecture video [here](#).

Did you watch the video? [Type yes or no.]

Question 1

Compute the following integrals using Sage.

Part a

$$\int \sin(3x) \sin(2x) dx$$

1

Part b

$$\int e^{5t} \sin(4t) dt$$

2

Part c

$$\int_0^{\pi/2} \sin(ax)^2 dx$$

3

Part d

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

Part e

$$\int_0^1 x \tan(x) dx$$

[Use numerical_integral]

Question 2

The velocity at time t of a particle travelling in a straight line is given by the equation $v(t) = 3t^3 - 4t^2 + 10$. How far does the particle travel from $t = 10$ to $t = 20$?

[Hint: Distance traveled is the integral of velocity.]

Question 3

Let $f(x) = 2x\sqrt{1-x^3}$.

Part a

Find the area between the graph of f and the x-axis from $x = 0$ to $x = 1$. Convert Sage's answer to a decimal.

Part b

Estimate the area in Part a using left and right Riemann sums with $n = 100$ subintervals.

Question 4

Use Sage to calculate $\frac{d}{dx} \int_x^{\sin(x)} 3t^2 dt$.

Note: The Fundamental Theorem of Calculus implies that

$$\frac{d}{dx} \int_{g(x)}^{h(x)} f(t) dt = f(h(x))h'(x) - f(g(x))g'(x).$$

Question 5

Use Sage to calculate $\int_5^{10} \frac{d}{dx} \frac{5}{1-x^2} dx$.

Note: The Fundamental Theorem of Calculus implies that $\int_a^b \frac{d}{dx} f(x) dx = f(b) - f(a)$.