

MA241 ASSIGNMENT 1 Fall 1996 Due 09/10/96

Let

$$f(x) = e^{-x} \sin(x^2).$$

If you ask Maple V to calculate the antiderivative of $f(x)$, it will fail since there is no elementary function with $f(x)$ as an antiderivative. However, by the Fundamental Theorem of Calculus there is antiderivative, and in this assignment you will investigate it.

1. Show that

$$F(x) = \int_0^x e^{-t} \sin(t^2) dt$$

is an antiderivatives of f by using Maple V to find the derivative of $F(x)$.

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2. Use Maple V to plot the graph of the antiderivative $F(x)$ for x in the interval $[0, 5]$.

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3. What is the *exact* value of $F(0)$? Is there any other antiderivative of $f(x)$ that has this value at $x = 0$? Explain

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Explanation:

4. The function $F(x)$ is one of an infinity antiderivatives of $f(x)$. Plot the graph of the antiderivative of $f(x)$ that has the value 2 when $x = 0$. Is there any other antiderivative of $f(x)$ equal to 2 at $x = 0$?

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Answer:

5. Estimate to 10 digits the area of the region between the x -axis and the graph of $f(x)$ as x varies between 0 and 5.

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