

Math 266B Section 02 (Barsamian) Computer Project 3: Using MATLAB to Check Antiderivatives

In Homework 3 exercises from section 7.3 of the textbook, you are asked to find a number of difficult antiderivatives. For each assigned exercise, you should produce a written solution that shows the steps that you used to find an antiderivative. In this computer project, the goal is to learn how to use MATLAB to check your results for those exercises. This computer project is not meant to be a substitute for a written solution. In doing this project, you will acquire three basic MATLAB skills:

- defining variables
- entering commands to find the antiderivative of a function
- telling MATLAB to simplify an answer

Get a blank sheet of paper ready for writing your responses the sixteen short questions posed in this project.

Start the MATLAB program. You should see a mostly-empty workspace with the “>>” symbol at the left. This workspace is called the *command window*, and the “>>” symbol is called the *command prompt*. The prompt indicates that MATLAB is ready to receive input from you. You will type input after the prompt.

1. At the *command prompt*, type `clear` This erases any previously stored values.
2. At the *command prompt*, type `syms x` (Be sure to include the space.) This creates a symbolic variable called x .
3. At the *command prompt*, type `int(x*exp(-2*x))` This command tells MATLAB to find $\int xe^{-2x} dx$, the antiderivative that you are asked to find in exercise 7.3#1. The program will respond by displaying an answer.
4. At the *command prompt*, type `simplify(ans)` This command tells MATLAB to simplify the previous answer. The program will respond by displaying a simplified answer.
5. Question: What is the answer that MATLAB gives?
6. Question: Does the MATLAB answer agree with your solution for homework exercise 7.3#1? (Hint: the answer to this question is supposed to be “yes”. If it is not yes, then work some more on your solution.)
7. At the *command prompt*, type `int(x*exp(-2*x^2))` This command tells MATLAB to find $\int xe^{-2x^2} dx$, the antiderivative that you are asked to find in exercise 7.3#2.
8. Question: What is the answer that MATLAB gives?
9. Question: Does the MATLAB answer agree with your solution for homework exercise 7.3#2?
10. At the *command prompt*, type `int(1/(x^2+3))` This command tells MATLAB to find $\int \frac{1}{x^2+3} dx$, the antiderivative that you are asked to find in exercise 7.3#10.
11. Question: What is the answer that MATLAB gives?
12. Question: Does the MATLAB answer agree with your solution for homework exercise 7.3#10?

13. At the *command prompt*, type `int(x/(x^2+3))` This command tells MATLAB to find $\int \frac{x}{x^2+3} dx$, the antiderivative that you are asked to find in exercise 7.3#11.
14. Question: What is the answer that MATLAB gives?
15. Question: Does the MATLAB answer agree with your solution for homework exercise 7.3#11?
16. At the *command prompt*, type `int(exp(x)*sin(x))` This command tells MATLAB to find $\int e^x \sin(x) dx$, the antiderivative that you have to do as part of exercise 7.3#21.
17. At the *command prompt*, type `simplify(ans)`
18. Question: What is the answer that MATLAB gives?
19. Question: Does the MATLAB answer agree with the antiderivative that you found on your way to the solution of homework exercise 7.3#21?
20. At the *command prompt*, type `int(1/((x-1)*(x+2)))` This command tells MATLAB to find $\int \frac{1}{(x-1)(x+2)} dx$, the antiderivative that you are asked to find in exercise 7.3#24.
21. Question: What is the answer that MATLAB gives?
22. Question: Does the MATLAB answer agree with your solution for homework exercise 7.3#24?
23. At the *command prompt*, type `int((2*x-1)/((x+4)*(x+1)))` This command tells MATLAB to find $\int \frac{2x-1}{(x+4)(x+1)} dx$, the antiderivative that you are asked to find in exercise 7.3#28.
24. Question: What is the answer that MATLAB gives?
25. Question: Does the MATLAB answer agree with your solution for homework exercise 7.3#28?
26. At the *command prompt*, type `int((x^2+4)/(x^2-4))` This command tells MATLAB to find $\int \frac{x^2+4}{x^2-4} dx$, the antiderivative that you are asked to find in exercise 7.3#35.
27. Question: What is the answer that MATLAB gives?
28. Question: Does the MATLAB answer agree with your solution for homework exercise 7.3#35?
29. You are done. On your sheet of paper, you should have written answers to the sixteen questions posed above. Attach this sheet of paper to your Homework #3 solutions.