

# Math 102, Fall 2021 — Homework 6

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Due October 20 at 5:00 pm

**Instructions.** This homework, like most others this semester, has two parts. One part is on Webwork, and the other part is some problems that you will write solutions to by hand and submit on Gradescope.

## Webwork

There are 6 webwork problems this week.

## Written problems

Write up solutions to the following problems, making sure to show your work, write neatly, scan clearly, and generally follow the [guidelines for writing good homework solutions](#). You should submit solutions on [Gradescope](#).

**Problem 1.** Find the following indefinite integrals by first doing some simplifying algebra.

1.  $\int x^3(x^2 + 1) dx$
2.  $\int \left(\sqrt{x^3} - \frac{2}{x}\right) dx$
3.  $\int \left(\frac{x+1}{x}\right) dx$

**Problem 2.** Find the general antiderivative of each of the following functions.

1.  $f(x) = 4x - \frac{1}{\sqrt{x}} + 9x^{3.5}$
2.  $f(x) = 3x^3 - 4e^x + 8$
3.  $f(x) = 7 \sin x - 4 \cos x$

**Problem 3.** Find the following definite integrals. To make things easier for the graders, give both an exact final answer like  $\ln 3 + e^3$  and a decimal final answer (to 4 decimal places) like  $\ln 3 + e^3 \approx 21.1842$ .

1.  $\int_0^3 (x^2 + 3x^{0.2} - 4) dx$
2.  $\int_0^2 3e^x dx$
3.  $\int_0^1 (\sin \theta + \cos \theta) dx$

**Problem 4.** Find the following areas using definite integrals.

1. The area between the curves  $y = 5e^x$ ,  $y = x$ ,  $x = 0$ , and  $x = 3$ .
2. The bounded area between the curves  $y = x^2$  and  $y = 2 - x^2$ .
3. The bounded region between the  $x$ -axis and the graph of  $y = x^3 - x$ .