MATH 152 Assignment 2, Fall 2026.

Webassign Exercises

5.4 Exercises 5, 15, 32, 59, 71

5.5 Exercises 1, 2, 4, 59

6.1 Exercises 13, 16, 17, 61

6.2 Exercises 5, 11, 19

Written Exercises

For exercises 8 and 9, upload screenshots of your work in Wolfram Alpha.

1 (Section 5.3)

(a) State the Fundamental Theorem of Calculus part 2.

(b) Apply the Fundamental Theorem of Calculus part 2 to show that

$$\int_a^b (f(x) - g(x))\, dx = \int_a^b f(x)dx - \int_a^b g(x)dx.$$

Hint: let $F(x)$ be an antiderivative of $f(x)$ and $G(x)$ be an antiderivative of $g(x)$.

2 (Section 5.4) Show that $\int \cos(x)^2 dx = \frac{1}{2}x + \frac{1}{4}\sin 2x + C$ by differentiating both sides and using the trig identities $\sin 2A = 2\sin A \cos A$ and $\cos 2A = 2\cos(A)^2 - 1$.

3 (Section 5.4) Water flows out of a storage tank at a rate of $r(t) = 100 - 10t$ litres per minute. Find the number of litres of water that flows out of the tank during $0 \leq t \leq 10$.

4 (Section 5.5) Calculate $\int \cot x\, dx$. Use $\cot x = \frac{\cos x}{\sin x}$ and make a substitution.

5 (Section 5.5) Use a substitution to show that $\int_0^4 e^{-\sqrt{x}} dx = \int_0^2 2xe^{-x} dx$.

6 (Section 6.1) Let A be the area between $f(x) = 3 - x^2$ and $g(x) = x^2 - 1$. Sketch A then express A as a definite integral then calculate A using the FTC.

7 (Section 6.2) Let V be the volume of a cone of height h with a base of radius r. Sketch the cone centered on the x axis. Show that $V = \frac{1}{3}\pi r^2 h$ by expressing V the volume of revolution about the x axis and evaluating the integral you get.

8 (Wolfram Alpha) Let $f(x) = \sin x \cos x$.

(a) Use Wolfram Alpha to graph $f(x)$ for $0 \leq x \leq \pi$. By inspection, what is $\int_0^\pi f(x)dx$?

(b) Use Wolfram Alpha to calculate $f'(x)$ then solve $f'(x) = 0$ then find the local minimum of $f(x)$ on $0 \leq x \leq \pi$.

9 (Wolfram Alpha) Let $f(x) = \sin x \cos x$ and $g(x) = x \ln x$.

(a) Use Wolfram Alpha to calculate the antiderivatives $\int f(x)dx$ and $\int g(x)dx$.

(b) Use Wolfram Alpha to calculate the definite integrals $\int_0^{\pi/2} f(x)dx$ and $\int_0^1 g(x)dx$.

Midterm 1 is on Friday October 2nd in class.

It covers the material on Assignments 1 and 2 which is Sections 4.9, 5.1−5.5, 6.1, and 6.2.