

Name:

due March 3

Math 126

Homework Assignment 14

Spring 2025

1. Let R be the region that lies under the curve $y = x^3$ and above the x -axis on the interval $[0, a]$, where a is a positive constant. Assuming that this region has constant density, find the center of mass of R .

2. Assuming constant density, find the center of mass of a solid hemisphere of radius r .

Name:

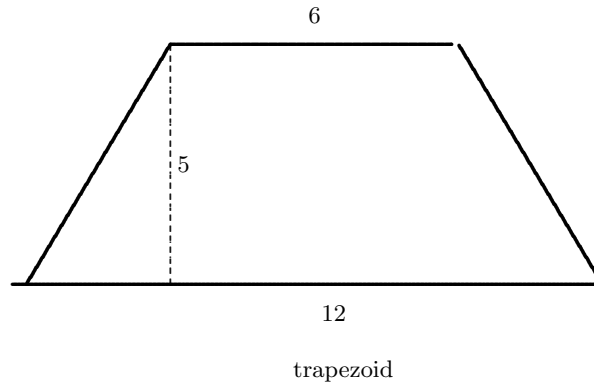
due February 28

Math 126

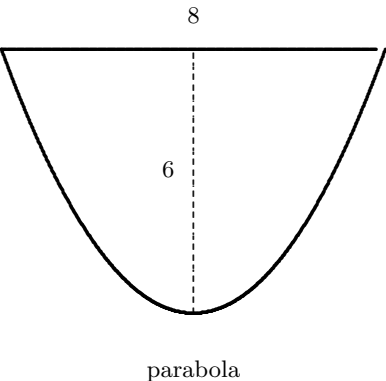
Homework Assignment 13

Spring 2025

1. Find the force exerted by a liquid with weight density w on one side of the vertically submerged plate shown below. As indicated, the shape of the plate is a trapezoid. The units on the figure are feet and the top of the plate is five feet beneath the surface of the liquid.



2. Find the force exerted by a liquid with weight density w on one side of the vertically submerged plate shown below. As indicated, the shape of the plate is a parabola. The units on the figure are feet and the top of the plate is four feet beneath the surface of the liquid.



Name:

due February 26

Math 126

Homework Assignment 12

Spring 2025

1. Let R be the region under the graph of $y = \cos x$ and above the x -axis on the interval $[0, \pi/2]$. Find the volume of the solid that is generated when R is revolved around the y -axis.

2. Let R be the region under the graph of $y = 16 - x^2$ and above the x -axis on the interval $[0, 4]$. Set up, but do not evaluate, an integral that represents the volume of the solid that is generated when R is revolved around (a) the line $x = 4$, (b) the line $y = 16$, (c) the line $x = -2$, and (d) the line $y = -6$.

3. A cylindrical hole of radius r is bored through the center of a sphere with radius $R > r$. The remaining solid resembles a bead since it has a flat top and bottom with a hole through the middle. Find the volume of the bead.

Name:

due February 24

Math 126

Homework Assignment 11

Spring 2025

1. Let R be the region that lies below the parabola $y = 18 - \frac{1}{2}x^2$ and above the x -axis. Suppose that R is the base of a solid and that each cross section of the solid taken perpendicular to the y -axis is a semicircle. Find the volume of this solid.

2. Let R be the region under the graph of $y = 8/x$ and above the x -axis on the interval $[2, 4]$. Find the volume of the solid that is generated when R is revolved around the x -axis.

3. Let R be the region bounded by the curves $y = \frac{1}{2}x^2$ and $y = 5x$. Find the volume of the solid that is generated when R is revolved around (a) the x -axis, (b) the y -axis.

3. Let R be the region under the curve $y = 9/x^2$ and above the x -axis on the interval $[1, 3]$.
- Find a vertical line that divides the region R into two parts of equal area.
 - Find a horizontal line that divides the region R into two parts of equal area.

Name:

due February 12

Math 126

Homework Assignment 9

Spring 2025

1. Evaluate $\int x \sec^2 x \, dx$.

2. Evaluate $\int_0^\pi 4x \sin x \, dx$.

3. Find the area of the region that lies under the graph of $y = 2 \ln x$ and above the x -axis on the interval $[1, e^3]$. [This problem should end with a complete sentence "The area ..."]

4. Evaluate $\int_2^{\infty} \frac{x^2 + 8x}{x^4} dx$. [Be sure to use correct notation for improper integrals.]

Name:

due February 10

Math 126

Homework Assignment 8

Spring 2025

1. Evaluate $\int \frac{12t}{(2t^2 + 7)^3} dt$.

2. Evaluate $\int \frac{2x + 3}{\sqrt{x + 2}} dx$.

3. Evaluate $\int_0^{\sqrt{2}} t\sqrt{4-t^4} dt$. [Remember that the FTC is not always the best way to evaluate an integral.]

4. Evaluate $\int_0^1 \frac{2}{x^{1/2} + x^{3/2}} dx$.

Name:

due February 7

Math 126

Homework Assignment 7

Spring 2025

1. Evaluate $\int \frac{24}{(6x+1)^2} dx$.

2. Evaluate $\int 8\sqrt[3]{3x+7} dx$.

3. Evaluate $\int_0^1 \frac{x+2}{2x^2+8x+1} dx$.

4. Evaluate $\int_0^3 (6x-8)\sqrt{9-x^2} dx$. (Carefully use the distributive property to split the integral into two integrals, then think carefully about the best way to evaluate each of the integrals.)

Name:

due February 5

Math 126

Homework Assignment 6

Spring 2025

1. Evaluate $\int_1^4 \frac{32}{x^3} dx$.

2. Evaluate $\int_0^1 (8x^3 - 5\sqrt[4]{x}) dx$.

3. Evaluate $\int_0^3 \frac{6}{3x+1} dx$.

4. Evaluate $\int_{-4}^4 4\sqrt{16-x^2} dx$. (Please think first.)

5. Find the area of the region under the curve $y = 6/(1+x^2)$ and above the x -axis on the interval $[-1, 1]$.

6. Evaluate $\int_0^1 9e^{3x} dx$.

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Homework Assignment 5

Spring 2025

1. Find the derivative of the function f defined by $f(x) = \int_0^{2x^2} \sqrt[3]{3t^2 + t} dt$.

2. Determine $F''(5)$ given that $F(x) = \int_x^{16} f(t) dt$ and $f(x) = \int_1^{3x} \frac{\ln(1+t)}{t} dt$.

3. Evaluate $\lim_{x \rightarrow 0} \frac{1}{x^5} \int_0^x (1 - \cos(t^2)) dt$.

4. Find an integral expression for a function f such that $f(5) = 0$ and $f'(x) = 3e^{-x^2}$.

Name:

due January 31

Math 126

Homework Assignment 4

Spring 2025

1. Evaluate $\int_0^3 (5|x - 2| + 4\sqrt{9 - x^2}) dx$.

2. Referring to Exercise 4 in Section 2.5, find the value of $\int_1^2 (3f(x) + 4g(x)) dx$.

3. Without evaluating either of the integrals, determine which integral is larger and explain why.

$$\int_4^7 \sqrt[4]{x^8 + x + 1} dx, \quad \int_4^7 x^2 dx.$$

Name:

due January 29

Math 126

Homework Assignment 3

Spring 2025

1. Use simple facts from geometry to find the area under the graph of each function and above the x -axis on the given interval. Include a sketch of the region whose area is being computed.

a) $f(x) = 10 - |2x - 6|$ on $[0, 6]$

b) $g(x) = \sqrt{16x - x^2}$ on $[0, 16]$

2. Use the definition of the integral to express the given integral as a limit of a sum.

a) $\int_2^5 (x^3 - 7x) dx$

b) $\int_0^\pi \sin x dx$

3. Use the definition of the integral to express the given limit as an integral. For part (b), you need to do some factoring as a first step.

a) $\lim_{n \rightarrow \infty} \sum_{i=1}^n \sqrt{4 + \frac{7i}{n}} \cdot \frac{1}{n}$

b) $\lim_{n \rightarrow \infty} \sum_{i=1}^n \frac{n}{n^2 + i^2}$

Name:

due January 27

Math 126

Homework Assignment 2

Spring 2025

1. Express the sum $\frac{2}{3} + \frac{4}{5} + \frac{6}{7} + \cdots + \frac{40}{41}$ using summation notation.

2. Find the sum $\sum_{k=11}^{20} k^3$. Do your computations without a calculator.

3. Evaluate $\lim_{n \rightarrow \infty} \sum_{k=1}^n \left(\frac{1}{k} - \frac{1}{k+2} \right)$. First find the sum as a function of n using telescoping sums.

4. Use the result of Exercise 2.1.7 to find $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \cdots + \frac{1}{1024}$. Simplify your answer.

Name:

due January 24

Math 126

Homework Assignment 1

Spring 2025

1. Find an equation for the line tangent to the graph of $y = 7x + \frac{8}{x^2}$ when $x = 2$.

2. Evaluate $\lim_{x \rightarrow \infty} \frac{6x^2 + 2x + 9}{\sqrt{3x^4 + 2x^2 + 7}}$.

3. Evaluate $\lim_{x \rightarrow 0} \frac{\sin x - x}{x^3}$.

4. Find and carefully simplify the derivative of the function f defined by $f(x) = \ln(x + \sqrt{x^2 - 5})$.

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Math 126

Homework Assignment 0

Spring 2025

1. Write down a few things about yourself: for example, hobbies, pets, memorable trips, academic interests

2. Describe one aspect of your experience with mathematics that causes you concern for Calculus II.

3. Describe one aspect of mathematics that you are interested or excited to learn about in Calculus II.