

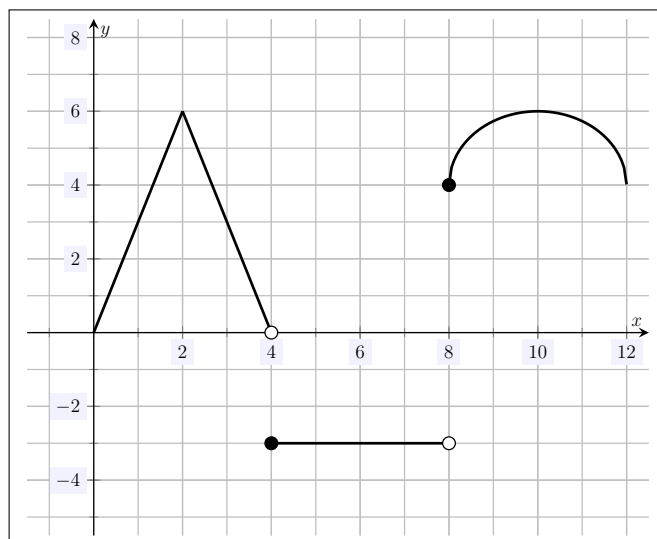
MATH 141: Exam 3
Fall — 2024
11/20/2024
75 Minutes

Name: _____

Write your name on the appropriate line on the exam cover sheet. This exam contains 10 pages (including this cover page) and 9 questions. Check that you have every page of the exam. Answer the questions in the spaces provided on the question sheets. Be sure to answer every part of each question and show all your work. If you run out of room for an answer, continue on the back of the page — being sure to indicate the problem number.

Question	Points	Score
1	15	
2	10	
3	10	
4	10	
5	10	
6	10	
7	15	
8	10	
9	10	
Total:	100	

1. (15 points) Consider the plot of a function $f(x)$ given below.



Using the above plot, compute the following:

(a) $\int_0^8 f(x) \, dx =$

(b) $\int_8^{12} f(x) \, dx =$

(c) $\int_0^{12} f(x) \, dx =$

(d) $\int_6^6 f(x) \, dx =$

- (e) The area between $f(x)$ and the x -axis.

2. (10 points) Showing all your work, compute the following:

(a) $\int (\sin x - 5^x + 3 \tan x) \, dx$

(b) $\int_0^1 \left(\frac{1}{\sqrt{x}} - e^x \right) \, dx$

3. (10 points) Showing all your work, compute the following:

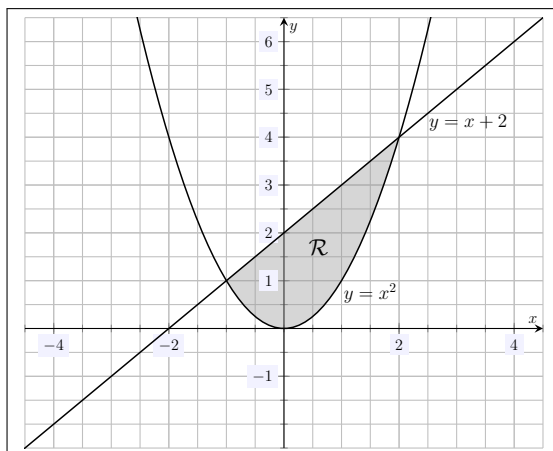
(a) $\frac{d}{dx} \int_{e^x}^{\pi} \frac{\arcsin(t)}{1+t^2} dt$

(b) $\frac{d}{dx} \int_{-2}^{\sec(5x)} \ln \left(\frac{1-t}{1+t} \right) dt$

4. (10 points) Showing all your work, compute the following:

$$\int \frac{dx}{5x^2 + 16}$$

5. (10 points) Consider the region, \mathcal{R} , shown below.



(a) Set-up *but do not evaluate* an integral with respect to x that computes the area of \mathcal{R} .

(b) Set-up *but do not evaluate* an integral with respect to y that computes the area of \mathcal{R} .

6. (10 points) Showing all your work, compute the following:

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

7. (15 points) Showing all your work, approximate the integral below using a left-hand sum with three evenly spaced rectangles *but do not evaluate or simplify this sum*.

$$\int_1^{13} (x \ln x - 1) \, dx$$

8. (10 points) Set-up *but do not evaluate* an integral which computes the area between $f(x) = 3x + 4$ and $g(x) = 8 - x^2$.

9. (10 points) Showing all your work, compute the following:

(a) $\int_{\pi/4}^{\pi/2} \cot x \csc x \, dx$

(b) $\int \left(3 \cos x - \frac{x^3 + 6\sqrt{x}}{\sqrt{x}} \right) dx$