

Section 5.1 How we measure distance traveled? (Part 1)

Area under the curve

P 1. Suppose a car is moving with increasing velocity along a straight road. Use the following data to answer the question.

$t(mi)$	0	2	4	6
$v(mi/h)$	10	20	25	40

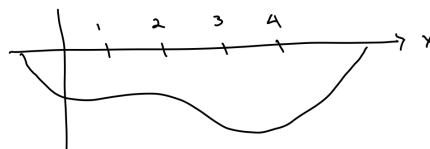
1. What is the shortest distance the car traveled?
2. What is the furthest the car could have traveled?
3. What is the difference between the two distances?

P 2. With time t in hours, the velocity of a car, in miles per hour, is given by $v(t) = 5t$. How far does the car travel in 3 hours?

Section 5.3 The Fundamental Theorem and Interpretations (Part 1)

Interpretations

P 3. Consider the graph of $f'(x)$ below.



1. Which has a greater value $f(0)$ or $f(1)$?
2. List the following in increasing order $\frac{f(4)-f(2)}{2}$, $f(3) - f(2)$, $f(4) - f(3)$.

P 4. Let $F(t) = 74^t$ and $a = 2$ and $b = 3$. What is $\int_a^b f(t)dt$ where $f(t) = F'(t)$?

Section 5.4 Theorems about Definite Integrals (Part 1)

Properties of the Definite Integral

P 5. Compute $\int_1^2 f(x) dx$ and $\int_2^1 5g(x) + 3f(x) dx$ given that $\int_1^2 f(x) dx = 10$ and $\int_1^2 g(x) dx = 5$.

P 6. Find the area of the region bounded by $f(x) = x^3$ and $g(x) = x^2$ on $[0, 1]$.

P 7. Find the area of the region bounded between $f(x) = x^2 + x + 1$ and $g(x) = -x^2 + 3x + 1$.

P 8. What is the average value of the function $f(x) = 1 + x$ on the interval $[0, 2]$?

Section 7.1 Integration by Substitution (Part 1)

Indefinite Integrals

P 9. Find $\int 2x \sin(x^2 + 1) dx$. Be sure to clearly state your w and dw .

P 10. Find $\int (3x^2 + 1)\sqrt{x + x^3} dx$.

P 11. Find $\int \frac{1+e^t}{t+e^t} dt$.

Definite Integrals

P 12. Compute $\int_0^4 \frac{e^{\sqrt{t}}}{\sqrt{t}} dt$ definite integral. Try using both methods from the lecture.

P 13. Find $\int_0^2 \frac{x}{(1+x^2)^2} dx$.

P 14. Find $\int x\sqrt{x+1} dx$.

P 15. Find $\int (x+7)\sqrt[3]{3-2x} dx$.

Section 7.2 Integration by Parts (Part 1)

Introduction

P 16. Use integration by parts to find $\int x \cos(x) dx$.

P 17. Find $\int x^2 \ln(x) dx$.

P 18. Use integration by parts to find $\int x^2 e^{3x} dx$. Be sure to write down u and v .

Going in circles

P 19. Find $\int \sin^2(x) dx$. Hint: You might find yourself going in circles.

P 20. Find $\int e^x \sin(x) dx$.

Section 7.4 Algebraic Identities and Trigonometric Substitutions (Part 1)

Partial Fractions

P 21. Sometimes you will have to factor a function before you can use partial fractions to compute the integral of it. Use partial fractions to find $\int \frac{1}{2x^2+3x-2} dx$.

Partial Fractions with Repeated Roots

P 22. Find $\int \frac{3}{(1-x)^2(x+2)} dx$.

Section 7.4 Algebraic Identities and Trigonometric Substitutions (Part 2)

Trigonometric Substitutions

P 23. Use trig substitution to find $\int \frac{1}{\sqrt{9-x^2}} dx$.

P 24. Find $\int \sqrt{16-x^2} dx$.

Section 7.6 Improper Integrals (Part 1)

Type I

P 25. Determine if $\int_0^{\infty} \frac{e^x}{1+e^x} dx$ converges or diverges.

P 26. Determine if $\int_2^{\infty} \frac{3}{x^3} dx$ converges or diverges.

P 27. Determine if $\int_{-\infty}^{\infty} \frac{1}{x^2+25} dx$ converges or diverges.