

# Sections 5.1-5.3

Aimee  
Steen

① a. Estimate the area under the graph of  $f(x) = \cos x$  on the interval  $(0, \frac{\pi}{2})$  using <sup>(4)</sup> approximate rectangles and right endpoints.

b. Repeat with left endpoints.

c. Repeat with midpoints.

\* tell if each estimate is an overestimate or underestimate

② Evaluate the integral  $\int_{-3}^0 (1 + \sqrt{9-x^2}) dx$  with approximate areas.

③ Evaluate the definite integral

$$\int_0^{\frac{1}{\sqrt{3}}} \frac{(t^2-1)}{(t^4-1)} dt$$

# Stephanie Katz 5.4 - 5.6

## 5.4 - The Fundamental Theorem of Calculus

$$14. h(x) = \int_0^{x^2} \sqrt{1+r^3} dr$$

## 5.5 - The Substitution Rule, U-Sub

$$22. \int \frac{\tan^{-1} x}{1+x^2} dx$$

$$48. \int_0^{\frac{\pi}{2}} \cos x \sin(\sin x) dx$$

## 5.6 - Integration by Parts

$$\int u dv = uv - \int v du$$

$$18. \int_4^{29} \frac{\ln y}{\sqrt{y}} dy$$

$$u = \ln y \quad v = 2\sqrt{y}$$

$$du = \frac{1}{y} dy \quad dv = \frac{1}{\sqrt{y}} dy$$

$$= \ln y (2\sqrt{y}) - \int \frac{2\sqrt{y}}{y} dy$$

$$= 2\sqrt{y} \ln y - 4\sqrt{y}$$

$$= 2\sqrt{29} \ln 29 - 4\sqrt{29} - (2\sqrt{4} \ln 4 - 4\sqrt{4})$$

$$= 2\sqrt{29} \ln 29 - 4\sqrt{29} - 4\sqrt{4} \ln 4 + 8$$

$$= 2\sqrt{29} \ln 29 - 4\sqrt{29} - 8\ln 2 + 8$$

Trig Substitutions for Integrals / 5.7  
Integration with Partial Fractions

Colin Whitney

1.

$$\int \frac{x^3}{\sqrt{16-x^2}} dx$$

Trig Substitutions for Integrals / 5.7  
Integration with Partial Fractions

Colin Whitney

2.

$$\int \sqrt{x^2 + 9} \, dx$$

hint:

$$\int \sec \theta d\theta = \ln |\sec \theta + \tan \theta| + c$$

Trig Substitutions for Integrals / 5.7  
Integration with Partial Fractions

Colin Whitney

3.

$$\int \frac{1}{x^2 - 4} dx$$

1. Sketch the region enclosed by the given curves. Find the area of the region. (6.1)

$$x = 1 - y^2, \quad x = y^2 - 1$$

2. Find the volume of the solid obtained by rotating the region bound by the given curves around the specific line. Sketch the region and label as either disk or washer. (6.2)

$$y = x^3, \quad y = \sqrt{x}, \quad \text{about the line } x = 1$$

3. If the birth rate of a population is  $b(t) = 2200e^{0.024t}$  people per year and the death rate is  $d(t) = 1400e^{0.018t}$  people per year, find the area between these curves for 10 years. What does the area represent? (6.2)

## 6.3

15.) Find the volume ~~of the volume~~ generated by rotating the region around the specified axis.

$$y = 4x - x^2, y = 3 \text{ about } x = 1$$

17.) Find the volume ~~of the~~ generated by rotating the region around the axis.

$$y = x^3, y = 0, x = 1 \text{ about } y = 1$$

29.) Find the volume of revolution

$$y = -x^2 + 6x - 8, y = 0 \text{ about } x\text{-axis}$$

Section 6.4 Arc length

Q1: Find the exact length of the curve  
 $y = \frac{1}{3}(x^2+2)^{3/2} \quad 0 \leq x \leq 1$

Q2: Find the exact length of the curve  
 $x = y^{3/2} \quad 0 \leq y \leq 1$

Section 6.5 Average Value of a function

Q3: Find the average value of the function  
 $f(x) = 3x^2 - 2x$  on the interval  $[1, 4]$

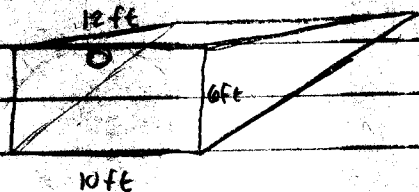


6.6#6, 22, 18

6.6 - 6 problems:

6. A spring has a natural length of 20 cm. If a 25 N force is req. to stretch it out to 30 cm, how much work is req. to stretch it from 20 - 25 cm?

22. A tank of water is full, find the work req. to pump the water out of the spout.



water weight  $62.5 \text{ lb/ft}^3$

18. Circular swimming pool w/ diameter of 24 ft, sides are 5 ft. high, and water is 4 ft. deep. How much work is req. to pump all of the water out and over the side  
water weight  $62.5 \text{ lb/ft}^3$

## 6.7 problems

4. demand =  $p = 20 - 0.05x$ , find  $C_{\text{surp}}$  when price level is at 300.

7. If a supply curve is modeled by the eq.

$p = 200 + 0.2x^{3/2}$ , find  $p_{\text{surp}}$  when the selling price is 400\$.

14. # of mosquitos increasing at a rate of

$$f(t) = 2200 + 10e^{0.8t}$$

by how much does the pop. change between 5th and 9th weeks?

Problem 1: Determine whether the sequence converges or diverges. If it converges, find the limit.

$$a_n = \tan\left(\frac{2n\pi}{1+8n}\right)$$

Problem 2: Determine whether the series is convergent or divergent. If it is convergent, find its sum.

$$\sum_{n=1}^{\infty} \frac{1+2^n}{3^n}$$

Problem 3: Find the value of  $c$  if

$$\sum_{n=2}^{\infty} (1+c)^{-n} = 2$$

Determine whether the series is divergent or convergent.

$$1) \sum_{n=2}^{\infty} \frac{1}{n \ln(n)}$$

$$2) \sum_{n=1}^{\infty} (-1)^{n+1} \frac{n}{n^2+9}$$

Determine whether series is absolutely convergent

$$3) \sum_{n=1}^{\infty} \frac{10^n}{(n+1) 4^{2n+1}}$$

NICOLE POTTER  
Sections 8.3-8.4

8.5 and 8.6

8.5: #22

Find the radius of convergence and interval of convergence of the series:

$$\sum_{n=2}^{\infty} \frac{x^{2n}}{n(\ln n)^2}$$

8.6: #4

Find a power series representation for the function and determine the interval of convergence.

$$f(x) = \frac{3}{1-x^4}$$

8.6: #26

Evaluate the indefinite integral as a power series. What is the radius of convergence?

$$\int \tan^{-1}(x^2) dx$$

SECTION 8.7: TAYLOR & MACLAURIN SERIES - KATHRYN

- 13) Find the Taylor Series for  $f(x)$  centered at the given value of  $a$ .  
Assume it has a power series expansion: Do not show that  $R_n(x) \rightarrow 0$ .

$$f(x) = e^x \quad a = 3$$

- 53) Use series to evaluate the limit:

$$\lim_{x \rightarrow 0} \frac{\sin x - x + \frac{1}{6}x^3}{x^5}$$

- 29) Obtain the Maclaurin series for the given function:

$$f(x) = x \cos\left(\frac{1}{2}x^2\right)$$