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Reading Assignment #1 (Section 7.1)

Due Wednesday, August 28 at the beginning of class

This assignment should be completed on separate paper. Write neatly and organize your work using looseleaf paper and nor pages torn from a notebook. Staple multiple pages together. Write your name and assignment in the top right-hand corner of the page. Answers should appear in the order below.

1. Explain integration in your own words. State the different ways (or 'tricks') you learned in Calculus I for evaluating integrals.
2. Write the formula for integration by parts. Use it to evaluate $\int x \cos x \, dx$.
3. Explain, in your own words, in what situations the integration by parts formula is necessary.
4. Follow Example 4 in 7.1 to evaluate $\int e^x \cos x \, dx$.

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Reading Assignment #2 (Sections 7.2, 7.3)

Due Wednesday, September 4 at the beginning of class

This assignment should be completed on separate paper. Write neatly and organize your work using looseleaf paper and nor pages torn from a notebook. Staple multiple pages together. Write your name and assignment in the top right-hand corner of the page. Answers should appear in the order below.

1. State the Pythagorean identities for $\sin x, \cos x$ and for $\tan x, \sec x$.
2. Follow Example 1 in Section 7.2 to evaluate $\int \sin^3 x \, dx$.
3. In your own words, explain the strategy for evaluating $\int \sin^m x \;\cos^n x \, dx$.
4. In your own words, explain the strategy for evaluating $\int \tan^m x \;\sec^n x \, dx$.
5. Explain, generally, Trig(onometric) Substitution in your own words. Copy down the rules from the Table in Section 7.3.
6. Follow Example 3 to evaluate
$$\int \frac{1}{x^2\sqrt{x^2+9}}\, dx.$$
Would substitution work for this problem? Why or why not?

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Reading Assignment #3 (Sections 7.4, 7.5, 7.7)

Due Monday, September 9 at the beginning of class

This assignment should be completed on separate paper. Write neatly and organize your work using looseleaf paper and nor pages torn from a notebook. Staple multiple pages together. Write your name and assignment in the top right-hand corner of the page. Answers should appear in the order below.

1. In your own words, explain the purpose of partial fraction decomposition and why it is useful in integration.

2. Write the four steps in Section 7.5 for deciding how to integrate a function. (You do not need to include all of the details.)

3. Follow Example 1 in Section 7.7 to evaluate $\int_1^5 (1/x^2)\, dx$ using the Trapezoid and the Midpoint Rule with $n = 4$. You are free to use a calculator here but show your computations. Generally, how do the Left-hand Rule, Right-hand Rule, Trapezoid Rule, and Midpoint Rule compare.

4. Explain why Simpson's Rule is generally the best of the rules we have considered. Evaluate $\int_1^5 (1/x^2)\, dx$ using Simpson's Rule with $n = 8$ (see Example 4 in Section 7.7 or find a shortcut in the book).

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Reading Assignment #4 (Section 7.8, 8.1, 8.2)

Due Monday, September 16 at the beginning of class

This assignment should be completed on separate paper. Write neatly and organize your work using looseleaf paper and nor pages torn from a notebook. Staple multiple pages together. Write your name and assignment in the top right-hand corner of the page. Answers should appear in the order below.

1. What are the two types of improper integrals and how are they different? Write the formulas for evaluating both types.
2. Explain in your own words what it means for an improper integral to converge.
3. Write the formula for arc length (in Section 8.1). Follow Example 1 in Section 8.1 to find the length of the arc $y^2 = 4x^2$ between the points $(1, 2)$ and $(2, 4)$.
4. Write the formula for surface area (in Section 8.2). Explain how integration is used to produce this formula in your own words. (That is, you should summarize how the formula is derived in the book.)

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Reading Assignment #5 (Chapter 9)

Due Monday, September 23 at the beginning of class

This assignment should be completed on separate paper. Write neatly and organize your work using looseleaf paper and nor pages torn from a notebook. Staple multiple pages together. Write your name and assignment in the top right-hand corner of the page. Answers should appear in the order below.

1. (Section 9.1) Give the definition of a differential equation. What is a solution to a differential equation? What differential equation models population growth?
2. (Section 9.3) Define a separable differential equation. Describe the method of solving a separable differential equation.
3. (Section 9.3) Follow Example 3 to solve the equation $y' = x^3 y$.
4. (Section 9.4) Give the definition of the logistic differential equation and the general solution. What does the variable M represent?
5. (Section 9.4) Follow Example 2 to solve the initial value problem

   $$\frac{dP}{dt} = 0.06P\left(1 - \frac{P}{100}\right) \qquad P(0) = 5.$$

   What is the population at time $t = 20$? At what time will the population reach 50?

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Reading Assignment #6 (Sections 10.1-10.5)

Due Monday, September 30 at the beginning of class

This assignment should be completed on separate paper. Write neatly and organize your work using looseleaf paper and nor pages torn from a notebook. Staple multiple pages together. Write your name and assignment in the top right-hand corner of the page. Answers should appear in the order below.

1. Explain, in your own words, what a parametric curve is. Follow Example 1 in Section 10.1 to plot the parametric curve $x = t^2 + 1$ and $y = t - 1$ for $-2 \leq t \leq 2$. What are the initial and terminal points of this curve? Can you write an equation of this curve just in terms of x and y?

2. Write the formula in Section 10.2 for dy/dx when x and y are given as parametric functions. Let C defined by the parametric equations $x = t^2 - t$ and $y = t^3 - 2t^2$ and follow Example 1 in Section 10.2 to find the points on C (written as pairs (x, y)) where the curve has a horizontal tangent line.

3. Describe the polar coordinate system from Section 10.3 in your own words.

4. Plot the points whose polar coordinates are given below,

$$\text{(a) } (1, \pi/4) \quad \text{(b) } (-2, 3\pi/2) \quad \text{(c) } (3, -\pi/3).$$

   Use Formula 1 in Section 10.2 to covert these points to Cartesian coordinates.

5. Write the formulas for differentiation and integration in polar coordinates from Section 10.4. Use the integration formula to compute the area inside the region traced by $r = 1 + \cos\theta$ (see Example 1 in 10.4).

6. Write the five equations for conic sections in Section 10.5

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Reading Assignment #7 (Sections 10.3, 10.4)

Due Monday, March 12 at the beginning of class

This assignment should be completed on separate paper. Write neatly and organize your work using looseleaf paper and nor pages torn from a notebook. Staple multiple pages together. Write your name and the assignment in the top right-hand corner of the page. Answers should appear in the order below.

1. (Section 10.3) Describe the polar coordinate system in your own words.
2. (Section 10.3) Plot the points whose polar coordinates are given below,
$$\text{(a) } (1, \pi/4) \quad \text{(b) } (-2, 3\pi/2) \quad \text{(c) } (3, -\pi/3).$$
3. (Section 10.3) Write the formula for converting between polar coordinates and Cartesian coordinates. Convert the points in the previous question to Cartesian coordinates.
4. (Section 10.3) Follow example 7 in page 662 to sketch the curve $r = 1 + \cos\theta$. What is this shape and how does it compare to $r = 1 + \sin\theta$?
5. (Section 10.3) Follow example 9 on page 664 to find the points on the curve $r = 1 + \cos\theta$ where the curve has horizontal tangent lines.
6. (Section 10.4) Write the formula for area of a polar region. Use it to compute the area inside the region traced by $r = 1 + \cos\theta$.
7. (Section 10.4) Write the formula for length of a polar curve. Use it to compute the length of the curve traced by $r = 2\cos\theta$, $0 \le \theta \le \pi$.

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Reading Assignment #7 (Section 11.1)

Due Monday, October 14 at the beginning of class

This assignment should be completed on separate paper. Write neatly and organize your work using looseleaf paper and nor pages torn from a notebook. Staple multiple pages together. Write your name and assignment in the top right-hand corner of the page. Answers should appear in the order below.

1. Define a sequence in your own words. Give your own example of a sequence (not one from the book, use your imagination).
2. Write the general term for the sequence below (see Example 2 in Section 11.1).
$$\left\{\frac{2}{3}, -1, \frac{8}{5}, -\frac{8}{3}, \frac{32}{7}, \cdots\right\}.$$
3. Define the limit of a sequence in your own words. Do you think the sequence in the previous problem converges? Why or why not?
4. State the Squeeze Theorem for sequences. Use it to show that the sequence $\left\{\frac{\sin(\pi n)}{n}\right\}$ converges.
5. Explain, in your own words, what it means for a function to be bounded and what it means to be monotonic. State the Monotonic Sequence Theorem.

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Reading Assignment #8 (Section 11.2)

Due Monday, October 21 at the beginning of class

This assignment should be completed on separate paper. Write neatly and organize your work using looseleaf paper and nor pages torn from a notebook. Staple multiple pages together. Write your name and the assignment in the top right-hand corner of the page. Answers should appear in the order below.

1. Define a series. Give your own example of a series (not one from the book, use your imagination).

2. Define a partial sum in your own words. Explain how partial sums are used to find the sum of a series.

3. What is a geometric series and when does it converge? Write the formula for the sum of a convergent geometric series. Use the formula to find the sum of the series

$$3 + 2 + \frac{4}{3} + \frac{8}{9} + \cdots .$$

   (See Example 3.)

4. What is the harmonic series. Summarize the book's argument for why it diverges. (Don't just copy the books proof. Explain it *briefly* in your own words.)

5. Write the Test for Divergence. Use it to explain why the series $\displaystyle\sum_{n=1}^{\infty} \frac{1}{4+e^{-n}}$ diverges.

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Reading Assignment #9 (Sections 11.3, 11.4)

Due Monday, October 28 at the beginning of class

This assignment should be completed on separate paper. Write neatly and organize your work using looseleaf paper and not pages torn from a notebook. Staple multiple pages together. Write your name and the assignment in the top right-hand corner of the page. Answers should appear in the order below.

1. Summarize (briefly) the argument in Section 11.3 detailing why $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^2}$ converges while $\displaystyle\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}}$ diverges.

2. State the Integral Test from Section 11.3. Use it to test the series $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^2+4}$ for convergence (see Example 1 in 11.3).

3. Write the p-series criteria from Section 11.3. Give an example (different from the book) of a convergent p-series and an example of a divergent p-series.

4. State the Comparison Test from Section 11.4. Use it to test the series $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^2+4}$ for convergence (see Example 1 in Section 11.4). What does the Comparison Test tell you about $\sum a_n$ if $\sum b_n$ is convergent and $a_n \geq b_n$ for all n?

5. State the Limit Comparison Test from Section 11.4. Use it to test the series $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^2+4}$ for convergence (see Example 4 in Section 11.4).

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Reading Assignment #10 (Section 11.5)

Due Monday, November 4 at the beginning of class

This assignment should be completed on separate paper. Write neatly and organize your work using looseleaf paper and not pages torn from a notebook. Staple multiple pages together. Write your name and the assignment in the top right-hand corner of the page. Answers should appear in the order below.

1. Describe an alternating series. Give an example of your own (not one from the book).
2. State the Alternating Series Test. Use it to show that the alternating series $\sum_{n=2}^{\infty} \frac{(-1)^{n-1}}{\ln(n)}$ converges (see Example 1 in 11.5).
3. How are the harmonic series and the alternating harmonic series different?
4. Is the series $\sum_{n=1}^{\infty} \frac{1+(-1)^n}{n^2}$ an alternating series. Explain why this series converges.
5. State the Alternating Series Estimation Theorem. Use it to determine the number of terms necessary to compute $\sum_{n=2}^{\infty} \frac{(-1)^{n-1}}{\ln(n)}$ correct to three decimal places. (See Example 4 in 11.5).

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Reading Assignment #11 (Section 11.6)

Due Monday, November 4 at the beginning of class

This assignment should be completed on separate paper. Write neatly and organize your work using looseleaf paper and not pages torn from a notebook. Staple multiple pages together. Write your name and the assignment in the top right-hand corner of the page. Answers should appear in the order below.

1. Describe the terms absolutely convergent and conditionally convergent, and explain how they are related. Give an example (different from those in the book) of a series that is conditionally convergent.
2. State the Ratio Test. Use the Ratio Test to show that the series $\displaystyle\sum_{n=1}^{\infty}(-1)^{n-1}\frac{n^4}{5^n}$ is absolutely convergent (see Example 1 in 11.6).
3. Can the Ratio Test be used to show that the alternating harmonic series converges? Why or why not?
4. State the Root Test. Describe when you might choose to use the Root Test over the Ratio Test.
5. Use the Root Test to show that the series $\displaystyle\sum_{n=1}^{\infty}\left(\frac{5n^2+3n+1}{4n^2-2n+3}\right)^n$ diverges (see Example 6 in 11.6).

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Reading Assignment #12 (Sections 11.8 and 11.9)

Due Monday, November 18 at the beginning of class

This assignment should be completed on separate paper. Write neatly and organize your work using looseleaf paper and not pages torn from a notebook. Staple multiple pages together. Write your name and the assignment in the top right-hand corner of the page. Answers should appear in the order below.

1. Explain what a power series is in your own words. Find the values of x such that the series $\displaystyle\sum_{n=0}^{\infty} \frac{(x+2)^n}{n}$ converges (see Example 2 in 11.8).
2. Define radius of convergence and interval of convergence. What is the difference between the two? What tests would one use to determine the radius of convergence? What tests would one use to check the endpoints of the interval?
3. Why would someone want to represent a function as a power series?
4. What is the power series representation of the function $\dfrac{1}{1-x}$? Use this to represent $\dfrac{1}{1+x^3}$ as a power series (see Example 1 in 11.9).
5. If a function has a power series representation with radius of convergence R, what is the radius of convergence of its derivative? Find the power series representation of $\dfrac{1}{(1-x)^3}$ (see example 5 in 11.9).

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Reading Assignment #13 (Sections 11.10 and 11.11)

Due Monday, November 25 at the beginning of class

This assignment should be completed on separate paper. Write neatly and organize your work using looseleaf paper and not pages torn from a notebook. Staple multiple pages together. Write your name and the assignment in the top right-hand corner of the page. Answers should appear in the order below.

1. Define a Taylor series and a Maclaurin series. Read over the computation at the beginning of 11.10. Summarize (briefly) how one obtains the formula for the coefficients of a Taylor series.
2. Example 1 in 11.10 gives the Taylor series expansion of e^x. Does this example prove that this *is* the power series representation of e^x? Why or why not? Could e^x have a different power series representation?
3. Write Taylor's Inequality from Section 11.10. How could this inequality be useful?
4. Find the Maclaurin series for $\cos x$ by following Example 4 in 11.10. You can check your answer with Example 5.
5. Find the first three nonzero terms of the Maclaurin series for $e^x \cos x$ (see example 13 in 11.10).
6. Approximate the function $f(x) = \sqrt{x}$ by a Taylor polynomial of degree 3 at $a = 4$ (see Example 1 in 11.11). How accurate is this approximation when $3 \leq x \leq 5$?