Calculus II - Fall 2014 - Mr. Clontz - Midterm Exam

Name: ____ 9am / 10am

- If you completed the practice midterm, turn it in before beginning this exam.
- This exam is closed-note and closed-book.
- The withdrawal deadline is the evening of Tuesday, October 7. If you need me to post your grade to Canvas before the deadline, please mark this circle:
  ◯ POST GRADE BEFORE WITHDRAWAL DEADLINE

Good luck!

Multiple Choice (10 points total)

Please only mark the correct choice for each question.

1. (3 points) foo

2. (3 points) foo

3. (4 points) foo

Full Solutions (90 points total)

Please show all work and draw a $\boxed{\text{box}}$ around your final answer, if appropriate. Solutions will be graded according to the rubrics given in the practice midterm.

1. (10 points) Find a general formula for the sequence $\left\{\frac{3}{2}, -\frac{4}{4}, \frac{5}{8}, -\frac{6}{16}, \frac{7}{32}, \dots\right\}$.

2. (10 points) Does the series $\sum_{n=1}^{\infty} \frac{(-2)^{n-1}}{3^n}$ converge or diverge? If it converges, give its sum.

3. (10 points) Determine whether or not $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{\sqrt{n}}$ is absolutely convergent, conditionally convergent, or divergent.

4. (10 points) Determine whether the series $\sum_{n=2}^{\infty} \frac{\sqrt{n^5}}{n^3 - 3}$ converges or diverges.

Compare with Ch 11 Problems 94-99 and similar problems from earlier sections.

Use an identifiable series convergence test.	2 points
Use an appropriate series convergence test.	2 points
Correctly use the chosen series convergence test.	4 points
Identify series as convergent or divergent.	2 points

5. (10 points) Determine whether the series $\sum_{n=0}^{\infty} \frac{e^n}{(n+1)!}$ converges or diverges.

   See question #4 for details.

6. (10 points) Determine whether the series $\displaystyle\sum_{n=0}^{\infty} \frac{3+x^2}{x^2(x^2+1)}$ converges or diverges.

See question #4 for details.

7. (10 points) For what values of x is the series $\sum_{n=1}^{\infty} \frac{(2x+1)^n}{n^2}$ convergent? What is its radius of convergence?

Compare with Ch 11 Problems 103-107.

Use either the Ratio or Root Test as appropriate.	2 points
Find a correct inequality for convergent x-values, ignoring endpoints.	2 points
Correctly identify each endpoint as convergent/divergent.	2 points each
Give the correct radius of convergence.	2 points

8. (10 points) Give a power series representing the function $f(x) = \frac{2}{2-x}$ and its radius of convergence.

Compare with Ch 11 Problems 109-112.

Set up function in the form $\frac{a}{1-r}$.	4 points
Set up the geometric series $\sum_{n=0}^{\infty} ar^n$.	4 points
Give the radius of convergence.	2 points

9. (10 points) The function $f(x) = \frac{3x}{1-x}$ is represented by the power series $\sum_{n=0}^{\infty} 3x^{n+1}$. Give a power series representing the function $f'(x) = \frac{3}{(1-x)^2}$.

Compare with Ch 11 Problems 114-116.

Attempt to differentiate/integrate the given series as appropriate.	4 points
Correctly differentiate/integrate the given series as appropriate.	4 points
Give correctly formatted series for final answer.	2 points

10. (10 points) Find the Maclaurin series representing the function $f(x) = e^{2x}$.

Compare with Ch 11 Problems 119-122.

Use MacLaurin series formula.	2 points
Compute derivatives $f^{(n)}(x)$.	2 points
Find formula for $f^{(n)}(0)$ (possibly splitting up odds/evens).	4 points
Give correctly formatted series for final answer.	2 points

11. (10 points) Evaluate $\int 3x^2 \cos(x)\, dx$.

Compare with Ch 7 Problems 3-7.

Set up correct u and dv.	2 points
Compute correct du and v.	2 points
Apply integration by parts to get solvable $uv - \int v\, du$.	4 points
Find correct final answer (possibly using int. by parts multiple times).	2 points

12. (10 points) Evaluate $\int \tan^7(y)\sec^4(y)\,dy$.

Compare with Ch 7 Problems 9,10,14,15

Use correct trigonometric identities.	3 points
Rewrite integral with single trig function and its derivative.	3 points
Use u substitution to eliminate trig functions.	2 points
Find correct final answer.	2 points