Answer Key 1

MATH 10560: Calculus II **Practice Exam 3.1** *November 23, 2009*

Record your answers to the multiple choice problems by placing an × through one letter for each problem on this page. There are 12 multiple choice questions worth 7 points each. You start with 16 points.

You may not use a calculator.

1.	a	b	•	d	e	7.	a	•	c	d	e
2.	a	•	c	d	e	8.	•	b	c	d	e
3.	a	b	c	d	•	9.	a	b	c	•	e
4.	a	•	c	d	e	10.	a	b	c	d	•
5.	a	•	c	d	e	11.	a	b	c	•	e
6.	a	b	•	d	e	12.	a	b	•	d	e

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1. Find the sum of the series $\sum_{n=0}^{\infty} \frac{(-2)^{2n}}{n!}$.

(a) $\cos(2)$ (b) $\frac{1}{e^4}$ (c) e^4 (d) $\sin(2)$ (e) $\frac{1}{5}$

2. Find the Taylor series of $f(x) = e^{3x}$ centered at $a = 1$.

(a) $\sum_{n=0}^{\infty} \frac{1}{n!}(3x)^n$ (b) $\sum_{n=0}^{\infty} \frac{3^n e^3}{n!}(x-1)^n$ (c) $\sum_{n=0}^{\infty} \frac{1}{n!}(3x-1)^n$

(d) $\sum_{n=0}^{\infty} \frac{3^n}{n!}(x-1)^n$ (e) $\sum_{n=0}^{\infty} \frac{e^3}{n!}x^n$

3. Find the radius of convergence of $\sum_{n=0}^{\infty} \frac{2^n}{n^2}x^{2n}$.

(a) 1 (b) ∞ (c) $\frac{1}{4}$ (d) $\frac{1}{2}$ (e) $\frac{1}{\sqrt{2}}$

4. Determine which statement applies to $\sum_{n=2}^{\infty} \frac{1+\sqrt{n}}{\sqrt{n^4-n^2-1}}$.

(a) *diverges by the Comparison Test with* $\sum_{n=2}^{\infty} \frac{1}{n}$

(b) *converges by the Limit Comparison Test with* $\sum_{n=2}^{\infty} \frac{1}{n^{3/2}}$

(c) *converges by the Ratio Test*

(d) *diverges by the Integral Test*

(e) *diverges by the Root Test*

5. Determine which statement applies to $\sum_{n=0}^{\infty} \frac{(-10)^{3n}}{(n+1)^n}$.

(a) *diverges*

(b) *converges absolutely*

(c) *partial sums are increasing*

(d) *is not alternating*

(e) *converges conditionally*

6. Use the binomial series to expand $\sqrt{1+x^3}$ as a power series.

(a) $1 - \frac{1}{2}x^3 + \frac{1}{8}x^4 - \frac{1}{16}x^5 + \cdots$

(b) $1 + \frac{1}{2}x^3 + \frac{1}{4}x^6 + \frac{1}{8}x^9 + \cdots$

(c) $1 + \frac{1}{2}x^3 - \frac{1}{8}x^6 + \frac{1}{16}x^9 - \cdots$

(d) $1 + \frac{1}{2}x^3 + \frac{1}{4}x^4 + \frac{1}{16}x^5 + \cdots$

(e) $1 + \frac{1}{2}x^3 - \frac{1}{4}x^6 + \frac{1}{8}x^9 - \cdots$

7. Estimate the error of approximating $\sum_{n=1}^{\infty} \frac{1}{n^5}$ by the first 10 terms.

(a) 5×10^{-4} (b) 2.5×10^{-5} (c) 2×10^{-4} (d) 10^{-5} (e) 3.34×10^{-3}

8. Evaluate $\int \cos(x^2)\, dx$ as a power series.

(a) $C + x - \frac{1}{2! \cdot 5} x^5 + \frac{1}{4! \cdot 9} x^9 - \frac{1}{6! \cdot 13} x^{13} + \cdots$

(b) $C + \frac{1}{2} x^2 - \frac{1}{3! \cdot 4} x^4 + \frac{1}{5! \cdot 6} x^6 - \frac{1}{7! \cdot 8} x^8 + \cdots$

(c) $C + x - \frac{1}{2! \cdot 3} x^3 + \frac{1}{4! \cdot 5} x^5 - \frac{1}{6! \cdot 7} x^7 + \cdots$

(d) $C + x - \frac{1}{2! \cdot 3} x^3 + \frac{1}{4! \cdot 7} x^3 - \frac{1}{6! \cdot 11} x^{11} + \cdots$

(e) $C + \frac{1}{2} x^2 - \frac{1}{2! \cdot 3} x^3 + \frac{1}{3! \cdot 4} x^4 - \frac{1}{4! \cdot 5} x^5 + \cdots$

9. Determine which series *converge*.

(I) $\sum_{n=2}^{\infty} \frac{\ln(n)}{n^2}$ (II) $\sum_{n=1}^{\infty} \frac{n}{n!+1}$ (III) $\sum_{n=1}^{\infty} (-1)^n \frac{n}{n+10}$

(a) I, II, III (b) I (c) II, III (d) I, II (e) II

10. Find the sum of the series $\sum_{n=1}^{\infty} \frac{2^n + (-1)^n}{3^n}$.

(a) 3/2 (b) 5/2 (c) 3 (d) 15/4 (e) 7/4

11. Determine which statements are *true*.

(I) If $\lim_{n\to\infty} a_n = 0$, then $\sum_{n=1}^{\infty} a_n$ converges.

(II) If $0 \le a_n \le b_n$, for all n, then $\sum_{n=1}^{\infty} a_n$ converges if and only if $\sum_{n=1}^{\infty} b_n$ converges.

(III) For a continuous decreasing function $f(x) \ge 0$, $\sum_{n=1}^{\infty} f(n)$ converges if and only if $\int_1^{\infty} f(x)\,dx$ converges.

(a) I, II, III (b) II, III (c) I, II (d) III (e) I, III

12. Use *Taylor's Inequality* to determine the minimum number of terms in the Maclaurin series for $\ln(1-x)$ that are needed to estimate $\ln(0.5)$ to within 0.01.

(a) 200 (b) 40 (c) 100 (d) 50 (e) 25