Answer Key 1

MATH 10560: Calculus II **Practice Exam 3.2** *November 18, 2008*

Record your answers to the multiple choice problems by placing an $\times$ 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] [c] [•] [e]
2. [a] [b] [c] [d] [•]
3. [a] [b] [c] [•] [e]
4. [a] [•] [c] [d] [e]
5. [a] [•] [c] [d] [e]
6. [a] [b] [c] [d] [•]
7. [•] [b] [c] [d] [e]
8. [•] [b] [c] [d] [e]
9. [a] [b] [c] [•] [e]
10. [a] [•] [c] [d] [e]
11. [a] [•] [c] [d] [e]
12. [a] [•] [c] [d] [e]

MATH 10560: Calculus II **Practice Exam 3.2** *November 18, 2008*

Record your answers to the multiple choice problems by placing an $\times$ 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] [c] [d] [e]
2. [a] [b] [c] [d] [e]
3. [a] [b] [c] [d] [e]
4. [a] [b] [c] [d] [e]
5. [a] [b] [c] [d] [e]
6. [a] [b] [c] [d] [e]
7. [a] [b] [c] [d] [e]
8. [a] [b] [c] [d] [e]
9. [a] [b] [c] [d] [e]
10. [a] [b] [c] [d] [e]
11. [a] [b] [c] [d] [e]
12. [a] [b] [c] [d] [e]

1. Determine which *one* of the following series converges.

(a) $\sum_{n=2}^{\infty} \frac{1}{\sqrt{n}-1}$ (b) $\sum_{n=1}^{\infty} \sin\left(\frac{1}{n}\right)$ (c) $\sum_{n=1}^{\infty}(-1)^n$

(d) $\sum_{n=1}^{\infty}\left(\frac{1}{n}-\frac{1}{n+2}\right)$ (e) $\sum_{n=1}^{\infty} \frac{n-1}{n^2+1}$

2. Estimate the error of approximating the series $\sum_{n=2}^{\infty} \frac{n}{(n^2-1)^2}$ by $\frac{2}{3^2}+\frac{3}{8^2}+\frac{4}{15^2}$.

(a) 3/16 (b) 4/225 (c) 5/288 (d) 1/48 (e) 1/30

3. Determine which of the following statements are *true*.

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

(II) The Ratio Test cannot be used to determine whether $\sum_{n=1}^{\infty} \frac{1}{n^3}$ converges.

(III) If $a_n > 0$ and $\sum_{n=1}^{\infty} a_n$ converges then $\sum_{n=1}^{\infty}(-1)^n a_n$ converges.

(a) (I), (II), and (III) (b) None (c) (I) and (II)

(d) (II) and (III) (e) (I) and (III)

4. Find the interval of convergence of $\sum_{n=1}^{\infty} \frac{(x-2)^n}{n3^n}$.

(a) $[-1,1]$ (b) $[-1,5)$ (c) $(1,3)$ (d) $(-1,5]$ (e) $[1,3]$

5. Determine which of the following statements applies to the series $\sum_{n=1}^{\infty} \frac{(-3)^{2n}}{n^n}$.

(a) Converges by the alternating series test.

(b) Converges by the root test.

(c) Diverges by the alternating series test.

(d) The root and alternating series tests are inconclusive.

(e) Diverges by the root test.

6. Derive the Taylor series for $f(x) = \ln(x)$ centered at $a = 1$.

(a) $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n} x^n$ (b) $\sum_{n=1}^{\infty} \frac{1}{n} x^n$ (c) $\sum_{n=1}^{\infty} (-1)^{n+1}(x-1)^n$

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

7. Use power series to compute $\lim_{x \to 0} \frac{\ln(1-x^6) + x^6}{\sin(x^4) - x^4}$.

(a) 3 (b) 0 (c) 1/2 (d) 1 (e) 1/6

8. A sequence is defined recursively by $a_1 = 1$ and $a_{n+1} = \frac{1}{4}(a_n + 5)$ for $n \geq 1$. Assuming the sequence is increasing and bounded above, find the limit $\lim_{n \to \infty} a_n$.

(a) 5/3 (b) 9/5 (c) 3/2 (d) 7/4 (e) 2

9. Find the sum of the series $\sum_{n=0}^{\infty} \frac{2}{5^{n+1}}$.

(a) 2/5 (b) 2 (c) 5/2 (d) 1/2 (e) 5/4

10. Determine which phrase applies to the series $\sum_{n=1}^{\infty}(-1)^{n+1}\frac{\sqrt{n+1}}{n^2+n-3}$

(a) *diverges* (b) *converges conditionally*

(c) *has an infinite radius of convergence* (d) *converges absolutely*

(e) *is not alternating*

11. Use the Binomial Series to expand $\frac{1}{(1-x^2)^{1/3}}$ as a power series.

(a) $1-\frac{1}{3}x^2+\frac{1}{9}x^4+\frac{7}{81}x^6+\cdots$ (b) $1+\frac{1}{3}x^2+\frac{2}{9}x^4+\frac{14}{81}x^6+\cdots$

(c) $1+x^{2/3}+x^{4/3}+x^2+\cdots$ (d) $1+\frac{1}{3}x^2+\frac{1}{9}x^4+\frac{7}{27}x^6+\cdots$

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

12. Find a power series representation of $f(x)=\frac{x}{1+2x^2}$.

(a) $\sum_{n=0}^{\infty}\frac{1}{2^n}x^{2n+1}$ (b) $\sum_{n=0}^{\infty}(-2)^n x^{2n+1}$ (c) $\sum_{n=0}^{\infty}2^n x^{2n}$

(d) $\sum_{n=0}^{\infty}\frac{(-1)^n}{2}x^{n+1}$ (e) $\sum_{n=0}^{\infty}\frac{(-1)^n}{2^n}x^n$