Name: ________________________ Class: ___________________ Date: __________ ID: A

Math2414-TestReview3-Fall2016

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. Write the first five terms of the sequence.

$$a_n = (-1)^{n+2}\left(\frac{11}{n}\right)$$

a. $11,\ \frac{11}{2},\ \frac{11}{3},\frac{11}{4},\ \frac{11}{5}$

b. $11,\ -\frac{11}{2},\ \frac{11}{3},-\frac{11}{4},\ \frac{11}{5}$

c. $-11,\ -\frac{11}{2},\ \frac{11}{3},\frac{11}{4},\ -\frac{11}{5}$

d. $-11,\ -\frac{11}{2},\ -\frac{11}{3},-\frac{11}{4},\ -\frac{11}{5}$

e. $-11,\ \frac{11}{2},\ -\frac{11}{3},\frac{11}{4},\ -\frac{11}{5}$

____ 2. Write the first three terms of the sequence.

$$a_n = 1 - \frac{3}{n} + \frac{5}{n^2}$$

a. $3,\ \frac{3}{4},\ -\frac{13}{9}$

b. $3,\ \frac{3}{4},\ \frac{5}{9}$

c. $3,\ -\frac{3}{4},\ \frac{5}{9}$

d. $3,\ \frac{1}{2},\ -\frac{1}{3}$

e. $3,\ -\frac{3}{4},\ -\frac{13}{9}$

____ 3. Write an expression for the nth term of the sequence $\frac{10}{11}, \frac{19}{20}, \frac{28}{29}, \frac{37}{38}, \ldots$.

a. $\frac{9n}{9n+2}$

b. $\frac{9n}{9n+1}$

c. $\frac{9n-1}{9n+1}$

d. $\frac{9n+1}{9n+2}$

e. $\frac{9n-1}{9n+2}$

____ 4. Find the sum of the convergent series.

$$\sum_{n=1}^{\infty} \frac{9}{(n+9)(n+11)}$$

a. $\frac{189}{220}$

b. $\frac{135}{143}$

c. $\frac{351}{220}$

d. $\frac{61}{55}$

e. $\frac{19}{20}$

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____ 5. Find all values of x for which the series converges. For these values of x, write the sum of the series as a function of x.

$$\sum_{n=0}^{\infty} 10\left(\frac{x-8}{10}\right)^{n}$$

a. $-\dfrac{100}{18-x}, -2 < x < 18$

b. $\dfrac{100}{18-x}, -2 < x < 18$

c. $\dfrac{100}{28+x}, -12 < x < 28$

d. $\dfrac{100}{28-x}, -12 < x < 28$

e. The series diverges for all x.

____ 6. Use the Integral Test to determine the convergence or divergence of the series.

$$\sum_{n=2}^{\infty} \frac{10}{n\sqrt{\ln n}}$$

a. diverges
b. converges
c. Integral Test inconclusive

____ 7. True or false: The series $\displaystyle\sum_{n=1}^{\infty} \frac{1}{(6n+7)^{3}}$ converges.

a. true
b. false

____ 8. Use Theorem 9.11 to determine the convergence or divergence of the series.

$$\sum_{n=1}^{\infty} \frac{2}{n^{\frac{5}{9}}}$$

a. converges
b. diverges
c. Theorem 9.11 inconclusive

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____ 9. Determine the convergence or divergence of the series.

$$\sum_{n=1}^{\infty} \frac{4}{n \cdot \sqrt[8]{n}}$$

a. converges
b. diverges
c. cannot be determined

____ 10. Determine the convergence or divergence of the series.

$$8 \cdot \sum_{n=1}^{\infty} \frac{1}{n^{1.15}}$$

a. converges
b. diverges
c. cannot be determined

____ 11. Use the Direct Comparison Test (if possible) to determine whether the series $\sum_{n=5}^{\infty} \frac{1}{7n^2+4}$ converges or diverges.

a. converges
b. diverges

____ 12. Use the Direct Comparison Test (if possible) to determine whether the series $\sum_{n=1}^{\infty} \frac{2^n}{8^n+1}$ converges or diverges.

a. diverges
b. converges

____ 13. Use the Limit Comparison Test to determine the convergence or divergence of the series $\sum_{n=1}^{\infty} \frac{9}{n\sqrt{n^2+6}}$.

a. The series $\sum_{n=1}^{\infty} \frac{9}{n\sqrt{n^2+6}}$ diverges.
b. The series $\sum_{n=1}^{\infty} \frac{9}{n\sqrt{n^2+6}}$ converges.

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____ 14. Use the polynomial test to determine whether the series $\frac{1}{20}+\frac{2}{23}+\frac{3}{28}+\frac{4}{35}+\frac{5}{44}\ldots$ converges or diverges.

a. The series $\frac{1}{20}+\frac{2}{23}+\frac{3}{28}+\frac{4}{35}+\frac{5}{44}$ ... diverges.
b. The series $\frac{1}{20}+\frac{2}{23}+\frac{3}{28}+\frac{4}{35}+\frac{5}{44}$ ... converges.

____ 15. Determine the convergence or divergence of the series $\frac{1}{550}+\frac{1}{1100}+\frac{1}{1650}+\frac{1}{2200}\ldots$.

a. The series $\frac{1}{550}+\frac{1}{1100}+\frac{1}{1650}+\frac{1}{2200}\ldots$ converges.
b. The series $\frac{1}{550}+\frac{1}{1100}+\frac{1}{1650}+\frac{1}{2200}\ldots$ diverges.

____ 16. Determine whether the series $\sum_{n=1}^{\infty}\frac{(-1)^{n+1}}{n+2}$ converges conditionally or absolutely, or diverges.

a. The series converges conditionally but does not converge absolutely.
b. The series converges absolutely but does not converge conditionally.
c. The series diverges.
d. The series converges absolutely.

____ 17. Determine whether the series $\sum_{n=0}^{\infty}\frac{\cos(n\pi)}{n+3}$ converges conditionally or absolutely, or diverges.

a. The series converges absolutely.
b. The series diverges.
c. The series converges absolutely but does not converge conditionally.
d. The series converges conditionally but does not converge absolutely.

____ 18. Approximate the sum of the series by using the first six terms.

$$\sum_{n=0}^{\infty}\frac{(-1)^n 4}{n!}$$

a. $1.457 < S < 1.477$
b. $1.417 < S < 1.497$
c. $1.467 < S < 1.472$
d. $1.427 < S < 1.467$
e. $1.461 < S < 1.473$

____ 19. Approximate the sum of the series by using the first six terms.

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

a. $1.799 < S < 1.805$
b. $1.794 < S < 1.806$
c. $1.794 < S < 1.805$
d. $1.792 < S < 1.792$
e. $1.698 < S < 1.902$

____ 20. Determine the minimal number of terms required to approximate the sum of the series with an error of less than 0.004.

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

a. 10
b. 5
c. 8
d. 6
e. 4

____ 21. Use the Ratio Test to determine the convergence or divergence of the series.

$$\sum_{n=1}^{\infty} n\left(\frac{3}{10}\right)^n$$

a. diverges
b. Ratio Test inconclusive
c. converges

____ 22. Use the Ratio Test to determine the convergence or divergence of the series.

$$\sum_{n=1}^{\infty} \frac{(-1)^{n-1}\left(\frac{7}{2}\right)^n}{n^2}$$

a. diverges
b. converges
c. Ratio Test inconclusive

____ 23. Identify the most appropriate test to be used to determine whether the series $\sum_{n=1}^{\infty} \frac{\cos n}{6^n}$ converges or diverges.

a. Limit Comparison Test with $b_n = \frac{1}{6^n}$
b. Direct Comparison Test with $b_n = \frac{1}{6^n}$
c. Alternating Series Test
d. Root Test
e. Ratio Test

____ 24. Find the values of x for which the series $\sum_{n=0}^{\infty} 5\left(\frac{x}{4}\right)^n$ converges.

a. $-5 < x < 0$
b. $0 < x < 5$
c. $-4 < x < 4$
d. $-5 < x < 5$
e. $0 < x < 4$

____ 25. Find a first-degree polynomial function P_1 whose value and slope agree with the value and slope of $f(x) = \frac{10}{\sqrt{x}}$ at $x = 25$.

a. $1 + \frac{1}{25}x$
b. $1 - \frac{1}{25}x$
c. $-3 - \frac{1}{25}x$
d. $3 + \frac{1}{25}x$
e. $3 - \frac{1}{25}x$

____ 26. Consider the function $f(x) = \frac{20}{\sqrt{x}}$, and its second-degree polynomial $P_2(x) = 20 - 10(x-1) + \frac{15}{2}(x-1)^2$ at $x = 0.8$. Compute the value of $f(0.8)$ and $P_2(0.8)$. Round your answer to four decimal places.

a. $f(0.8) \approx 22.3607; P_2(0.8) \approx 44.6000$
b. $f(0.8) \approx 22.3607; P_2(0.8) \approx 22.3000$
c. $f(0.8) \approx 45.7214; P_2(0.8) \approx 45.6000$
d. $f(0.8) \approx 21.3607; P_2(0.8) \approx 21.3000$
e. $f(0.8) \approx 23.3607; P_2(0.8) \approx 22.3000$

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____ 27. Find the Maclaurin polynomial of degree 4 for the function.

$f(x) = \cos(5x)$

a. $1+\dfrac{25}{2}x^2-\dfrac{625}{24}x^4$
b. $1-\dfrac{25}{2}x^2+\dfrac{625}{24}x^4$
c. $1-\dfrac{125}{6}x^2+\dfrac{625}{24}x^4$
d. $1+\dfrac{125}{6}x^2-\dfrac{625}{24}x^4$
e. $x-\dfrac{125}{6}x^3+\dfrac{625}{24}x^5$

____ 28. Find the third Taylor polynomial for $f(x) = \dfrac{7}{x}$, expanded about $c = 1$.

a. $P_3(x) = 7-7(x-1)-14(x-1)^2-7(x-1)^3$
b. $P_3(x) = 7-7(x-1)+7(x-1)^2-7(x-1)^3$
c. $P_3(x) = 7-7(x-1)+14(x-1)^2-14(x-1)^3$
d. $P_3(x) = 7-7(x+1)+7(x+1)^2-7(x+1)^3$
e. $P_3(x) = 7-7(x-1)-42(x-1)^2-7(x-1)^3$

____ 29. Find the radius of convergence of the power series.

$$\sum_{n=0}^{\infty} \frac{(-1)^n x^n}{5^n}$$

a. $\dfrac{1}{25}$
b. $\dfrac{1}{5}$
c. 5
d. ∞
e. 25

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____ 30. Find the radius of convergence of the power series.

$$\sum_{n=0}^{\infty} \frac{(8x)^{2n}}{(2n)!}$$

a. ∞
b. 16
c. 64
d. 0
e. 8

____ 31. Find the interval of convergence of the power series. (Be sure to include a check for convergence at the endpoints of the interval.)

$$\sum_{n=1}^{\infty} \frac{(x-4)^{n-1}}{4^{n-1}}$$

a. $\left(0, 4\right)$
b. $\left(-4, 4\right)$
c. $\left(4, 8\right)$
d. $\left(-8, 8\right)$
e. $\left(0, 8\right)$

____ 32. Find the interval of convergence of the power series $\sum_{n=0}^{\infty} \frac{x^{3n+1}}{(3n+1)!}$. (Be sure to include a check for convergence at the endpoints of the interval.)

a. $\left(-\infty, 4\right)$
b. $\left[-4, 4\right]$
c. $\left[-3, 3\right]$
d. $\left(4, \infty\right)$
e. $\left(-\infty, \infty\right)$

____ 33. Write an equivalent series of the series $\sum_{n=0}^{\infty} \frac{x^n}{n!}$ with the index of summation beginning at $n = 5$.

a. $\sum_{n=5}^{\infty} \frac{x^{n-5}}{(n-5)!}$

b. $\sum_{n=5}^{\infty} \frac{x^{n-5}}{n!}$

c. $\sum_{n=5}^{\infty} \frac{x^{n+5}}{n!}$

d. $\sum_{n=5}^{\infty} \frac{x^{n+5}}{(n+5)!}$

e. $\sum_{n=5}^{\infty} \frac{x^{n}}{(n-5)!}$

____ 34. Consider the function given by $f(x) = \sum_{n=0}^{\infty} \left(\frac{x}{9}\right)^n$. Find the interval of convergence for $\int f(x)\,dx$.

a. $\left(-9,9\right)$
b. $\left(-9,0\right]$
c. $\left[-9,9\right]$
d. $\left[-9,9\right)$
e. $\left(0,9\right)$

____ 35. Consider the function given by $f(x) = \sum_{n=1}^{\infty} \frac{(-1)^{n+1}(x-7)^n}{n}$. Find the interval of convergence for $\int f(x)\,dx$.

a. $\left[-7,7\right]$
b. $\left[6,8\right]$
c. $\left(6,8\right)$
d. $\left(0,8\right)$
e. $\left(-7,7\right)$

____ 36. Find a power series for the function $\dfrac{1}{1-9x}$ centered at 0.

a. $\displaystyle\sum_{n=0}^{\infty}\left(\frac{x}{9}\right)^{n}$

b. $\displaystyle\sum_{n=0}^{\infty}(-9x)^{n}$

c. $\displaystyle\sum_{n=0}^{\infty}\left(\frac{9}{x}\right)^{n}$

d. $\displaystyle\sum_{n=0}^{\infty}(9x)^{n}$

e. $\displaystyle\sum_{n=0}^{\infty}(-1)^{n}(9x)^{n}$

____ 37. Explain how to use the geometric series $g(x)=\dfrac{1}{1-x}=\displaystyle\sum_{n=0}^{\infty}x^{n}, |x|<1$ to find the series for the function $\dfrac{9}{1+x}$.

a. replace x with $\dfrac{9}{(-x)}$
b. replace x with $(-x)$ and multiply the series by 9
c. replace x with $\dfrac{1}{x}$ and divide the series by 9
d. replace x with $(-x)$ and divide the series by 9
e. replace x with $\dfrac{9}{x}$

____ 38. Find the sum of the convergent series $\displaystyle\sum_{n=0}^{\infty}(-1)^{n}\frac{1}{4^{2n+1}(2n+1)}$ by using a well-known function. Round your answer to four decimal places.

a. 0.1419
b. 0.2450
c. 0.8961
d. 0.1651
e. 0.1974

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____ 39. Use the definition to find the Taylor series centered at $c = 1$ for the function $f(x) = \dfrac{1}{x}$.

a. $\dfrac{1}{x} = \sum_{n=0}^{\infty} (-1)^n x^n$

b. $\dfrac{1}{x} = \sum_{n=1}^{\infty} (-1)^n (x+1)^n$

c. $\dfrac{1}{x} = \sum_{n=0}^{\infty} (-1)^{n+1} (x-1)^n$

d. $\dfrac{1}{x} = \sum_{n=1}^{\infty} (-1)^n (x)^n$

e. $\dfrac{1}{x} = \sum_{n=0}^{\infty} (-1)^n (x-1)^n$

____ 40. Use a power series to approximate the value of the integral $\int_0^1 e^{-x^4}\,dx$ with an error of less than 0.01. Round your answer to two decimal places.

a. 0.81
b. 0.74
c. 0.89
d. 0.88
e. 0.84

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Answer Section

MULTIPLE CHOICE

1. ANS: E PTS: 1 DIF: Medium REF: Section 9.1
OBJ: Write the first terms of a sequence given its nth term MSC: Skill
2. ANS: B PTS: 1 DIF: Medium REF: Section 9.1
OBJ: Write the first terms of a sequence given its nth term MSC: Skill
3. ANS: D PTS: 1 DIF: Medium REF: Section 9.1
OBJ: Write an expression for the nth term of a sequence MSC: Skill
4. ANS: A PTS: 1 DIF: Medium REF: Section 9.2
OBJ: Calculate the sum of a telescoping series MSC: Skill
5. ANS: B PTS: 1 DIF: Medium REF: Section 9.2
OBJ: Identify the interval of convergence of a geometric power series
MSC: Skill
6. ANS: A PTS: 1 DIF: Medium REF: Section 9.3
OBJ: Test a series for convergence using the Integral Test MSC: Skill
7. ANS: A PTS: 1 DIF: Easy REF: Section 9.3
OBJ: Test a series for convergence using the Integral Test MSC: Skill
8. ANS: B PTS: 1 DIF: Medium REF: Section 9.3
OBJ: Test a p-series for convergence MSC: Skill
9. ANS: A PTS: 1 DIF: Medium REF: Section 9.3
OBJ: Test a p-series for convergence MSC: Skill
10. ANS: A PTS: 1 DIF: Medium REF: Section 9.3
OBJ: Test a p-series for convergence MSC: Skill
11. ANS: A PTS: 1 DIF: Easy REF: Section 9.4
OBJ: Test a series for convergence using the Direct Comparison Test
MSC: Skill
12. ANS: B PTS: 1 DIF: Easy REF: Section 9.4
OBJ: Test a series for convergence using the Direct Comparison Test
MSC: Skill
13. ANS: B PTS: 1 DIF: Easy REF: Section 9.4
OBJ: Test a series for convergence using the Limit Comparison Test
MSC: Skill
14. ANS: A PTS: 1 DIF: Medium REF: Section 9.4
OBJ: Test a series for convergence using the polynomial test MSC: Skill
15. ANS: B PTS: 1 DIF: Medium REF: Section 9.4
OBJ: Test a series for convergence using the Direct Comparison Test
MSC: Skill
16. ANS: A PTS: 1 DIF: Easy REF: Section 9.5
OBJ: Test a series for absolute/conditional convergence MSC: Skill
17. ANS: D PTS: 1 DIF: Medium REF: Section 9.5
OBJ: Test a series for absolute/conditional convergence MSC: Skill
18. ANS: E PTS: 1 DIF: Medium REF: Section 9.5
OBJ: Approximate the sum of the series by using the first terms
MSC: Skill

19. ANS: C PTS: 1 DIF: Medium REF: Section 9.5
OBJ: Approximate the sum of the series by using the first terms
MSC: Skill
20. ANS: D PTS: 1 DIF: Medium REF: Section 9.5
OBJ: Determine the minimal number of terms required to approximate the sum of the series with an error
MSC: Skill
21. ANS: C PTS: 1 DIF: Easy REF: Section 9.6
OBJ: Test a series for convergence using the Ratio Test MSC: Skill
22. ANS: A PTS: 1 DIF: Medium REF: Section 9.6
OBJ: Test a series for convergence using the Ratio Test MSC: Skill
23. ANS: B PTS: 1 DIF: Medium REF: Section 9.6
OBJ: Identify the most appropriate test to be used to test a series for convergence
MSC: Skill
24. ANS: C PTS: 1 DIF: Medium REF: Section 9.6
OBJ: Identify the interval of convergence of a geometric power series
MSC: Skill
25. ANS: E PTS: 1 DIF: Medium REF: Section 9.7
OBJ: Create a first-degree Taylor polynomial for a function MSC: Skill
26. ANS: B PTS: 1 DIF: Medium REF: Section 9.7
OBJ: Find the value of a function and a second-degree Taylor polynomial at a point
MSC: Skill
27. ANS: B PTS: 1 DIF: Medium REF: Section 9.7
OBJ: Write a Maclaurin polynomial for a given function MSC: Skill
28. ANS: B PTS: 1 DIF: Easy REF: Section 9.7
OBJ: Write a Taylor polynomial for a given function MSC: Skill
29. ANS: C PTS: 1 DIF: Easy REF: Section 9.8
OBJ: Identify the radius of convergence of a power series MSC: Skill
30. ANS: A PTS: 1 DIF: Easy REF: Section 9.8
OBJ: Identify the radius of convergence of a power series MSC: Skill
31. ANS: E PTS: 1 DIF: Medium REF: Section 9.8
OBJ: Identify the interval of convergence of a power series MSC: Skill
32. ANS: E PTS: 1 DIF: Medium REF: Section 9.8
OBJ: Identify the interval of convergence of a power series MSC: Skill
33. ANS: A PTS: 1 DIF: Medium REF: Section 9.8
OBJ: Write a power series as an equivalent series after a change of index
MSC: Skill
34. ANS: D PTS: 1 DIF: Medium REF: Section 9.8
OBJ: Identify the interval of convergence of the antiderivative of a power series
MSC: Skill
35. ANS: B PTS: 1 DIF: Difficult REF: Section 9.8
OBJ: Identify the interval of convergence of the antiderivative of a power series
MSC: Skill
36. ANS: D PTS: 1 DIF: Easy REF: Section 9.9
OBJ: Represent a function as a power series using the geometric power series
MSC: Skill
37. ANS: B PTS: 1 DIF: Medium REF: Section 9.9
OBJ: Explain how to use the geometric power series to find a power series for a function
MSC: Skill

38. ANS: B PTS: 1 DIF: Difficult REF: Section 9.9
OBJ: Calculate the sum of a series using a known power series MSC: Skill
39. ANS: E PTS: 1 DIF: Easy REF: Section 9.10
OBJ: Write the Taylor series of a function centered at a specified point
MSC: Skill
40. ANS: E PTS: 1 DIF: Difficult REF: Section 9.10
OBJ: Approximate a definite integral by using power series MSC: Skill