King Fahd University of Petroleum and Minerals
Department of Mathematics

Math 102
Final Exam
Term 252
May 13, 2026
Net Time Allowed: 120 Minutes

MASTER VERSION

Question 26 / Section 8.8 Page 579

1. $\displaystyle\int_1^{\infty} \frac{\ln x}{x}\,dx$

(a) diverges _____ (correct)

(b) converges to 1

(c) converges to 0

(d) converges to e

(e) converges to e^2

Question 42 / Section 8.8 Page 579

2. $\displaystyle\int_3^{6} \frac{dx}{\sqrt{36-x^2}}$

(a) converges to $\frac{\pi}{3}$ _____ (correct)

(b) diverges

(c) converges to $\frac{\pi}{2}$

(d) converges to $\frac{\pi}{6}$

(e) converges to 0

Question 44 / Section 9.1 Page 596

3. The sequence whose nth term is $a_n = \dfrac{\cos 2n}{3^n}$ converges to:

(a) 0 _____ (correct)
(b) $\frac{3}{2}$
(c) 3
(d) $\frac{2}{3}$
(e) 2

Questions 30, 32 / Section 9.2 Page 605

4. $\displaystyle\sum_{n=0}^{\infty}\left(-\frac{1}{5}\right)^n + \sum_{n=1}^{\infty}\frac{1}{(2n+1)(2n+3)}$

(a) 1 _____ (correct)
(b) 2
(c) 3
(d) 4
(e) 5

Questions 22, 31, 32 / section 9.3 Page 613

5. Which one of the following series is/are convergent?

(I) $\sum_{n=1}^{\infty} \frac{n}{n^4+2n^2+1}$ (II) $\sum_{n=1}^{\infty} \frac{1}{n^{1.001}}$ (III) $\sum_{n=1}^{\infty} \frac{1}{n^{0.9}}$

(a) I and II only (correct)

(b) I, II and III

(c) I and III only

(d) II and III only

(e) III only

Questions 13, 18, 26 / Section 9.4 Page 620

6. Which one of the following series is/are divergent?

(I) $\sum_{n=1}^{\infty} \sin\frac{1}{n}$ (II) $\sum_{n=1}^{\infty} e^{-n^2}$ (III) $\sum_{n=1}^{\infty} \frac{5}{4^n+1}$

(a) I only (correct)

(b) I and II only

(c) II and III only

(d) II only

(e) I and III only

Question 36 / Section 9.5 Page 629

7. Using the Remainder Theorem, the least number of terms required to approximate the sum of the series $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n^2}$ with an error of less than 0.02 is:

(a) 7 (correct)

(b) 9

(c) 4

(d) 3

(e) 10

Question 17 / Section 9.5 Page 629

8. The series $\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n}}$

(a) converges conditionally (correct)

(b) diverges

(c) converges absolutely

(d) diverges by the Alternating Series Test

(e) converges by the Integral Test

Questions 24, 34, 44 / Section 9.6 Pages 637, 638

9. Which one of the following series is/are divergent?

(I) $\sum_{n=0}^{\infty} \frac{6^n}{(n+1)^3}$ (II) $\sum_{n=0}^{\infty} \frac{(n!)^2}{(3n)!}$ (III) $\sum_{n=1}^{\infty} \left(\frac{-3n}{2n+1}\right)^{3n}$

(a) I and III only (correct)

(b) I and II only

(c) II and III only

(d) I, II and III

(e) III only

Question 29 / Section 9.7 Page 649

10. If a Taylor polynomial for $f(x) = \sqrt{x}$ centered at $c = 4$ is written in the form $p_2(x) = a_2x^2 + a_1x + a_0$, then $64a_2 + 8a_1 + 4a_0 =$

(a) 5 (correct)

(b) 6

(c) 7

(d) 8

(e) 4

Question 24 / Section 9.8 Page 658

11. The series $\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n\, n!(x-5)^n}{3^n}$ converges

(a) only for $x = 5$ _____ (correct)

(b) on the interval $(-5, 5)$

(c) on the interval $(-\infty, \infty)$

(d) on the interval $[-5, 5]$

(e) on the interval $(-5, 5]$

Example 3 / Section 9.9 Page 663

12. A power series representation for the function $f(x) = \dfrac{3x-1}{x^2-1}$ centered at $c = 0$ is:

(a) $\displaystyle\sum_{n=0}^{\infty}[2(-1)^n - 1]\, x^n,\ (-1, 1)$ _____ (correct)

(b) $\displaystyle\sum_{n=0}^{\infty}[2(-1)^n + 1]\, x^n,\ (-1, 1)$

(c) $\displaystyle\sum_{n=0}^{\infty}[(-1)^n - 1]\, x^n,\ (-1, 1)$

(d) $\displaystyle\sum_{n=0}^{\infty}[(-1)^n + 1]\, x^n,\ (-1, 1)$

(e) $\displaystyle\sum_{n=0}^{\infty}[2(-1)^n + 2]\, x^n,\ (-1, 1)$

Question 37 / Section 9.10 Page 677

13. The Coefficient of x^7 in the Maclaurin Series for the function $f(x) = \sinh x$ is:

(a) $\dfrac{1}{7!}$ (correct)

(b) $\dfrac{-1}{7!}$

(c) $\dfrac{2}{7!}$

(d) $\dfrac{3}{7!}$

(e) $\dfrac{4}{7!}$

Question 57 / Review Chapter 5 Page 384

14. $\displaystyle\int \frac{\cos\theta}{\sqrt{1-\sin\theta}}\,d\theta =$

(a) $-2\sqrt{1-\sin\theta}+C$ (correct)

(b) $2\sqrt{1-\sin\theta}+C$

(c) $\sqrt{1-\sin\theta}+C$

(d) $-\sqrt{1-\sin\theta}+C$

(e) $\ln(\sqrt{1-\sin\theta})+C$

Similar to Question 12 / Section 8.4 Page 547

15. $\displaystyle\int \frac{4}{x^2\sqrt{4+x^2}}\,dx =$

(a) $\dfrac{-\sqrt{4+x^2}}{x}+C$ (correct)

(b) $\dfrac{-\sqrt{4+x^2}}{2}+C$

(c) $\dfrac{\sqrt{4+x^2}}{x}+C$

(d) $\dfrac{\sqrt{4+x^2}}{2}+C$

(e) $\dfrac{x\sqrt{4+x^2}}{2}+C$

Example 4 / Section 8.3 Page 535

16. $\displaystyle\int \frac{\tan^3 x}{\sqrt{\sec x}}\,dx =$

(a) $\frac{2}{3}(\sec x)^{3/2}+2(\sec x)^{-1/2}+C$ (correct)

(b) $\frac{1}{3}(\sec x)^{3/2}+(\sec x)^{-1/2}+C$

(c) $\frac{2}{3}(\sec x)^{3/2}-2(\sec x)^{-1/2}+C$

(d) $\frac{2}{3}(\sec x)^{3/2}-(\sec x)^{-1/2}+C$

(e) $\frac{1}{2}(\sec x)^{3/2}+(\sec x)^{-1/2}+C$

Question 20 / Review Chapter 7 Page 511

17. The volume of the solid generated by revolving the region bounded by the graphs of $y = e^{-x}$, $y = 0$, $x = 0$, and $x = 1$ about the x-axis is:

(a) $\frac{\pi}{2}\left(1 - \frac{1}{e^2}\right)$ (correct)

(b) $\frac{\pi}{2}\left(1 - \frac{1}{e}\right)$

(c) $\frac{\pi}{2}\left(1 + \frac{1}{e^2}\right)$

(d) $\frac{\pi}{2}\left(1 + \frac{1}{e}\right)$

(e) $\pi\left(1 - \frac{1}{e}\right)$

Similar to Question 1 / Review Chapter 7 Page 511

18. The area of the region bounded by the graphs of the equations

$y = 12 - x^2$, $y = x$, $x = -1$ and $x = 1$ is:

(a) $\frac{70}{3}$ (correct)

(b) $\frac{64}{3}$

(c) $\frac{62}{3}$

(d) $\frac{61}{3}$

(e) $\frac{65}{5}$

Question 28 / Review Chapter 7 Page 511

19. The arc length of the graph of the function $f(x) = \frac{1}{3}x^{3/2} - 1$ over the interval $[2, 6]$ is:

(a) $\frac{1}{3}(10^{3/2} - 6^{3/2})$ (correct)

(b) $\frac{1}{2}(10^{3/2} - 6^{3/2})$

(c) $\frac{1}{4}(10^{3/2} - 6^{3/2})$

(d) $\frac{1}{3}(10^{3/2} + 6^{3/2})$

(e) $\frac{1}{2}(10^{3/2} + 6^{3/2})$

Question 13 / Review Chapter 8 Page 583

20. $\int x \sec^2 x \, dx =$

(a) $x \tan x + \ln|\cos x| + C$ (correct)

(b) $\tan x + \ln|\cos x| + C$

(c) $x^2 \tan x + \ln|\cos x| + C$

(d) $x \tan x - \ln|\cos x| + C$

(e) $x \sec x + \ln|\cos x| + C$