King Fahd University of Petroleum and Minerals
Department of Mathematics
Math 102
Final Exam
243
05 August 2025
Net Time Allowed: 120 Minutes

MASTER VERSION

Question 30 / section 8.8 Page 579

1. $\int_0^\infty \frac{e^x}{1+e^x}\,dx$

(a) diverges _____ (correct)

(b) converges to 1

(c) converges to 0

(d) converges to e

(e) converges to $\frac{1}{e}$

Question 35 / Section 8.8 Page 579

2. $\int_0^2 \frac{dx}{\sqrt[3]{x-1}}$

(a) converges to 0 _____ (correct)

(b) diverges

(c) converges to 1

(d) converges to 2

(e) converges to 3

Question 43 / Section 9.1 Page 596

3. The sequence whose nth term is $a_n = \dfrac{\sin n}{n}$ converges to

(a) 0 (correct)
(b) 2π
(c) π
(d) $\dfrac{\pi}{2}$
(e) 2

Question 36 / Section 9.2 Page 605

4. $\displaystyle\sum_{n=0}^{\infty}[(0.3)^n + (0.8)^n] =$

(a) $\dfrac{45}{7}$ (correct)
(b) $\dfrac{44}{7}$
(c) $\dfrac{43}{7}$
(d) $\dfrac{46}{7}$
(e) $\dfrac{47}{7}$

Questions 7, 16, 38 / Section 9.3 Page 613

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

I) $\sum_{n=2}^{\infty} \frac{1}{n\sqrt{\ln n}}$ II) $\sum_{n=1}^{\infty} e^{-n}$ III) $\sum_{n=1}^{\infty} \frac{1}{n^{\pi}}$

(a) I only (correct)

(b) I and II only

(c) II and III only

(d) I, II and III

(e) I and III only

Questions 14, 15, 24 / Section 9.4 Page 620

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

I) $\sum_{n=1}^{\infty} \frac{\sin^2 n}{n^3}$ II) $\sum_{n=1}^{\infty} \frac{6^n + n}{5^n - 1}$ III) $\sum_{n=1}^{\infty} \frac{n}{(n+1)2^{n-1}}$

(a) I and III only (correct)

(b) I and II only

(c) II and III only

(d) II only

(e) I only

Question 35 / Section 9.5 Page 629

7. The least number of terms required to approximate the sum of the series $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n^3}$ with an error of less than 0.001 is
(Hint: Use the Reminder Theorem)

(a) 10 (correct)

(b) 12

(c) 14

(d) 16

(e) 18

Question 55 / Section 9.5 Page 630

8. The series $\sum_{n=0}^{\infty} \frac{\cos n\pi}{n+1}$

(a) converges conditionally (correct)

(b) diverges

(c) converges absolutely

(d) diverges by the Alternating Series Test

(e) converges absolutely by the Integral Test

Questions 19, 22, 42 / Section 9.6 Pages 637, 638

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

I) $\sum_{n=1}^{\infty} \frac{(n-1)!}{4^n}$ II) $\sum_{n=1}^{\infty} n^2 \left(\frac{5}{6}\right)^n$ III) $\sum_{n=1}^{\infty} \left(\frac{n-2}{5n+1}\right)^n$

(a) II and III only (correct)

(b) II only

(c) III only

(d) I and II only

(e) I and III only

Question 26 / Section 9.7 Page 648

10. Using a third degree Maclaurin polynomial of the function $f(x) = \tan x$, the approximation of the value $\tan 1$ is equal to

(a) $\frac{4}{3}$ (correct)

(b) $\frac{5}{3}$

(c) $\frac{7}{3}$

(d) $\frac{2}{3}$

(e) $\frac{8}{3}$

Question 26 / Section 9.8 Page 658

11. The interval of converges for the series $\sum_{n=1}^{\infty} \frac{(x-3)^{n+1}}{(n+1)4^{n+1}}$ is

(a) $[-1, 7)$ (correct)

(b) $(-1, 7)$

(c) $[-1, 7]$

(d) $(-1, 7]$

(e) $(-\infty, \infty)$

Question 28 / Section 9.9 Page 666

12. A power series representation for the function $f(x) = \arctan(2x)$ centered at $c = 0$ is

(a) $2\sum_{n=0}^{\infty} \frac{(-1)^n 4^n x^{2n+1}}{2n+1}$ (correct)

(b) $\sum_{n=0}^{\infty} \frac{(-1)^n 4^n x^{2n+1}}{2n+1}$

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

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

(e) $2\sum_{n=0}^{\infty} (-1)^n 4^n x^{2n+1}$

Question 36 / Section 9.10 Page 677

13. The Coefficient of x^9 in the Maclaurin Series for the function $f(x) = 2\sin x^3$ is

(a) $-\frac{1}{3}$ (correct)

(b) $\frac{1}{3}$

(c) $\frac{1}{2}$

(d) $-\frac{1}{2}$

(e) $\frac{1}{6}$

Question 85 / Review Chapter 5 Page 384

14. $\int_1^4 \frac{2x+1}{2x}\,dx =$

(a) $3 + \ln 2$ (correct)

(b) $2 + \ln 3$

(c) $3 - \ln 2$

(d) $2 - \ln 3$

(e) $3 + \ln 3$

Question 27 / Section 8.4 Page 547

15. $\int e^x \sqrt{1-e^{2x}}\, dx =$

(a) $\frac{1}{2}(\arcsin(e^x) + e^x\sqrt{1-e^{2x}}) + C$ (correct)

(b) $\arcsin(e^x) + e^x\sqrt{1-e^{2x}} + C$

(c) $\frac{1}{2}(\arccos(e^x) + e^x\sqrt{1-e^{2x}}) + C$

(d) $\arccos(e^x) + e^x\sqrt{1-e^{2x}} + C$

(e) $\frac{1}{2}(\arcsin(e^x) - e^x\sqrt{1-e^{2x}}) + C$

Question 21 / Section 8.5 Page 557

16. $\int_0^2 \frac{3}{4x^2+5x+1}\, dx =$

(a) $\ln 3$ (correct)

(b) $\ln 2$

(c) $\ln 4$

(d) $\ln 5$

(e) $\ln 6$

Question 14 (b) / Section 7.2 Page 461

17. The volume of the solid generated by revolving the region bounded by the graphs of $y = 2x^2$, $y = 0$, and $x = 2$ about the x-axis is

(a) $\frac{128\pi}{5}$ (correct)

(b) $\frac{64\pi}{5}$

(c) $\frac{32\pi}{5}$

(d) $\frac{16\pi}{5}$

(e) $\frac{8\pi}{5}$

Question 20 / Section 7.1 Page 450

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

$y = \frac{-4}{x^3}$, $y = 0$, $x = -3$ and $x = -1$ is

(a) $\frac{16}{9}$ (correct)

(b) $\frac{14}{9}$

(c) $\frac{13}{9}$

(d) $\frac{17}{9}$

(e) $\frac{19}{9}$

Question 89 / Review Chapter 5 Page 384

19. $\displaystyle\int \frac{dx}{e^{2x}+e^{-2x}} =$

(a) $\frac{1}{2}\arctan(e^{2x})+C$ (correct)

(b) $\arctan(e^{2x})+C$

(c) $\frac{1}{2}\arctan(e^{-2x})+C$

(d) $\arctan(e^{-2x})+C$

(e) $\ln(e^{2x}+e^{-2x})+C$

Question 44 / Section 8.2 Page 529

20. $\displaystyle\int_0^2 x^2e^{-2x}\,dx =$

(a) $\frac{-13+e^4}{4e^4}$ (correct)

(b) $\frac{13+e^4}{4e^4}$

(c) $\frac{13-e^4}{4e^4}$

(d) $\frac{-13-e^4}{4e^4}$

(e) $\frac{-13+e^4}{e^4}$