King Fahd University of Petroleum and Minerals
Department of Mathematics
Math 102
Final Exam
241
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Net Time Allowed: 120 Minutes

USE THIS AS A TEMPLATE

Write your questions, once you are satisfied upload this file.

Question 39/ Section 9.10 Page 677

1. The Maclaurin Series for the function $f(x) = \cos^2 x$ is:

(a) $\frac{1}{2}\left[1 + \sum_{n=0}^{\infty} \frac{(-1)^n (2x)^{2n}}{(2n)!}\right]$

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

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

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

(e) $\frac{1}{2}\left[1 + \sum_{n=0}^{\infty} \frac{(-1)^n (2x)^{n}}{(n)!}\right]$

Example 4 / Section 9.9 Page 664

2. A power series for $f(x) = \ln x$ centered at $x = 1$ is

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

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

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

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

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

Question 17 / Section 9.8 Page 658

3. The interval of convergence for $\sum_{n=1}^{\infty} \frac{(-1)^n x^n}{n}$ is

(a) $(-1, 1]$
(b) $[-1, 1)$
(c) $[-1, 1]$
(d) $(-1, 1)$
(e) $(-\infty, \infty)$

Question 27 / Section 9.7 Page 648

4. If a Taylor polynomial for $f(x) = \frac{2}{x}$ centered at $c = 1$ is written in the form $p_3(x) = a_3x^3 + a_2x^2 + a_1x + a_0$, then $a_3 + a_2 + a_1 + a_0 =$

(a) 2
(b) 1
(c) 0
(d) -1
(e) -2

Question 52 / Section 9.6 Page 638

5. By calculating $L = \lim_{n\to\infty} \sqrt[n]{|a_n|}$, where $a_n = \dfrac{(n!)^n}{(n^n)^2}$, the series $\sum_{n=1}^{\infty} a_n$

(a) diverges and $L = \infty$

(b) converges and $L = 0$

(c) converges and $L = \dfrac{1}{2}$

(d) diverges and $L = 2$

(e) converges and $L = 1$

Question 49 / Section 9.5 Page 630

6. The series $\sum_{n=2}^{\infty} \dfrac{(-1)^n}{n \ln n}$

(a) converges conditionally

(b) diverges

(c) converges absolutely

(d) diverges by the Alternating Series Test

(e) converges absolutely by the Integral Test

Example 5 / Section 9.5 Page 625

7. The least number of terms required to approximate the sum of the series $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n^4}$ with an error of less than 0.001 is

(a) 5
(b) 7
(c) 9
(d) 4
(e) 8

Questions 17, 20, 26 / Section 9.4 Page 620

8. Which one of the following series is **convergent** ?

I) $\sum_{n=1}^{\infty} \frac{n}{n^2+1}$ II) $\sum_{n=1}^{\infty} \frac{2^n+1}{5^n+1}$ III) $\sum_{n=1}^{\infty} \sin\frac{1}{n}$,

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

Questions 8, 33, 34 / Section 9.3 Page 613

9. Which one of the following series is **divergent** ?

I) $\sum_{n=1}^{\infty} \frac{1}{n^{\frac{5}{3}}}$ II) $\sum_{n=1}^{\infty} \frac{1}{\sqrt[5]{n}}$ III) $\sum_{n=1}^{\infty} ne^{-\frac{n}{2}}$

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

Examples 2, 3 / Section 9.2 Pages 601, 602

10. $\sum_{n=0}^{\infty} \frac{3}{2^n} + \sum_{n=1}^{\infty} \frac{2}{4n^2-1} =$

(a) 7
(b) 9
(c) 5
(d) 11
(e) 10

Example 4 / Section 9.1 Page 590

11. The sequence $a_n = \dfrac{n^2}{2^n - 1}$

(a) converges and its limit equals 0
(b) diverges
(c) converges and its limit equals 1
(d) converges and its limit equals 4
(e) converges and its limit equals 2

Example 3 / Section 8.8 Page 574

12. $\displaystyle\int_1^{\infty} (1-x)e^{-x}\,dx =$

(a) converges to $\dfrac{-1}{e}$
(b) diverges
(c) converges to e
(d) converges to 1
(e) converges to 0

Example 8 / Section 8.8 Page 576

13. $\int_{-1}^{2} \frac{dx}{x^3}$

(a) diverges

(b) converges to $\frac{3}{8}$

(c) converges to 3

(d) converges to 0

(e) converges to 1

Question 5 / Section 8.5 Page 557

14. $\int \frac{5}{x^2+3x-4}\,dx =$

(a) $\ln\left|\frac{x-1}{x+4}\right| + c$

(b) $\left|\frac{x+1}{x+4}\right| + c$

(c) $\ln\left|\frac{x+1}{x-4}\right| + c$

(d) $\ln\left|\frac{x+4}{x+1}\right| + c$

(e) $\left|\frac{x+4}{x+1}\right| + c$

Example 1 / Section 8.4 Page 542

15. $\displaystyle\int \frac{dx}{x^2\sqrt{9-x^2}} =$

(a) $\displaystyle -\frac{\sqrt{9-x^2}}{9x} + c$

(b) $\displaystyle \frac{\sqrt{9-x^2}}{9x} + c$

(c) $\displaystyle -\frac{\sqrt{9-x^2}}{x} + c$

(d) $\displaystyle -\frac{\sqrt{9-x^2}}{9x^2} + c$

(e) $\displaystyle \frac{\sqrt{9-x^2}}{9x^2} + c$

Question 22 / Section 8.2 Page 529

16. $\displaystyle\int \frac{\ln x}{x^3}\,dx =$

(a) $\displaystyle -\frac{1}{2x^2}\ln x - \frac{1}{4x^2} + c$

(b) $\displaystyle -\frac{1}{x^2}\ln x - \frac{1}{4x^2} + c$

(c) $\displaystyle -\frac{1}{2x^2}\ln x + \frac{1}{2x^2} + c$

(d) $\displaystyle -\frac{1}{2x^2}\ln x + \frac{1}{4x^2} + c$

(e) $\displaystyle -\frac{1}{x^2}\ln x + \frac{1}{x^2} + c$

Question 13(a) / Section 7.2 Page 461

17. The volume of the solid generated by revolving the region bounded by the graphs of $y = \sqrt{x}$, $y = 0$, and $x = 3$ about the x-axis is

(a) $\frac{9\pi}{2}$
(b) $\frac{7\pi}{2}$
(c) $\frac{11\pi}{2}$
(d) $\frac{13\pi}{2}$
(e) $\frac{15\pi}{2}$

Question 15 / Section 7.1 Page 450

18. The area of the region bounded by the graphs of the equations $y = x^2 - 1$, $y = -x + 2$, $x = 0$ and $x = 1$ is

(a) $\frac{13}{6}$
(b) $\frac{13}{5}$
(c) $\frac{17}{6}$
(d) $\frac{13}{4}$
(e) $\frac{13}{2}$

Question 62 / Review for Chapter 5 Page 384

19. $\int \frac{1}{t^2}(2^{-1/t})\,dt =$

(a) $\frac{2^{-1/t}}{\ln 2} + c$

(b) $2^{-1/t} + c$

(c) $\frac{-2^{-1/t}}{\ln 2} + c$

(d) $-2^{-1/t} + c$

(e) $\frac{2^{1/t}}{\ln 2} + c$

Question 86 / Review for Chapter 5 Page 384

20. $\int_1^e \frac{\ln x}{x}\,dx =$

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

(b) 1

(c) 0

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

(e) e