Practice Test 2 - Calculus II - Spring 2018

MULTIPLE CHOICE. (5pts each) Choose the one alternative that best completes the statement or answers the question. Write your choice in the space provided. No partial credit.

Evaluate the integral. (Hint: Product to Sum Formula)

1) $\int \cos 9x \cos 4x \, dx$ 1) _____

A) $\frac{1}{10}\sin 5x + \frac{1}{26}\sin 13x + C$

B) $\frac{1}{10}\cos 5x + \frac{1}{26}\cos 13x + C$

C) $\frac{1}{10}\sin 9x + \frac{1}{26}\sin 4x + C$

D) $\frac{1}{10}\sin 5x - \frac{1}{26}\sin 13x + C$

Integrate the function. (Hint: Trig Substitution)

2) $\int \frac{x^3}{\sqrt{x^2+4}} \, dx$ 2) _____

A) $\frac{1}{3}(x^2+4)^{3/2} + \tan^{-1}\left(\frac{x}{4}\right) + C$

B) $\frac{1}{3}\sqrt{x^2+4} - \frac{4}{\sqrt{x^2+4}} + C$

C) $\frac{1}{4}(x^2+4)^{3/2} - \sqrt{x^2+4} + C$

D) $\frac{1}{3}(x^2+4)^{3/2} - 4\sqrt{x^2+4} + C$

Evaluate the integral. (Hint: Substitution and Partial Fractions Decomposition)

3) $\int \frac{e^t \, dt}{e^{2t} - 7e^t + 6}$ 3) _____

A) $\frac{1}{5}\ln|e^t - 6| + \frac{1}{5}\ln|e^t - 1| + C$

B) $\frac{1}{5}e^t \ln|e^t - 6| - \frac{1}{5}e^t \ln|e^t - 1| + C$

C) $\frac{1}{5}\ln|t - 6| - \frac{1}{5}\ln|t - 1| + C$

D) $\frac{1}{5}\ln|e^t - 6| - \frac{1}{5}\ln|e^t - 1| + C$

Provide the proper response.

4) The error formula for Simpson's Rule depends upon 4) _____

i) f(x).

ii) f''(x).

iii) $f^{(4)}(x)$

iv) the number of steps

A) i, iii, and iv B) iii and iv C) i and iii D) ii and iv

Evaluate the improper integral or state that it is divergent. (Hint: u-sub)

5) $\int_0^{\infty} \frac{4(1 + \tan^{-1}x)}{1 + x^2} \, dx$ 5) _____

A) $2\pi\left(1 + \frac{\pi}{4}\right)$ B) $4\ln\left(1 + \frac{\pi}{2}\right)$ C) $2\left(1 + \frac{\pi}{2}\right)^2$ D) 2π

Find a formula for the nth term of the sequence.

6) 1, $-\frac{1}{4}, \frac{1}{9}, -\frac{1}{16}, \frac{1}{25}$ (reciprocals of squares with alternating signs) 6) _____

A) $a_n = \frac{(-1)^{2n+1}}{n^2}$ B) $a_n = \frac{(-1)^{n+1}}{n^2}$ C) $a_n = \frac{(-1)^{n^2}}{n^2}$ D) $a_n = \frac{(-1)^n}{n^2}$

Find the limit of the sequence if it converges; otherwise indicate divergence.

7) $a_n = \frac{2 - 1n + 3n^4}{5n^4 - 2n^3 + 2}$ 7) _____

A) $\frac{2}{5}$ B) $\frac{3}{5}$ C) $\frac{3}{2}$ D) Diverges

Find the sum of the series.

8) $\sum_{n=1}^{\infty} (-1)^{n-1} \frac{9}{7^n}$ 8) _____

A) $\frac{3}{2}$ B) $\frac{63}{8}$ C) $\frac{21}{2}$ D) $\frac{9}{8}$

Use the Divergence Test for divergence to show that the series is divergent, or state that the test is inconclusive.

9) $\sum_{n=1}^{\infty} \cos\frac{6}{n}$ 9) _____

A) converges, 6 B) converges, 1 C) inconclusive D) diverges

Provide an appropriate response.

10) Which of the following sequences do not meet the conditions of the Integral Test? 10) _____

I. $a_n = n(\sin n + 1)$

II. $a_n = \frac{1}{n^p + p}$

III. $a_n = \frac{1}{n\sqrt{n}}$

A) I and III B) I only C) I, II, and III D) II and III

SHORT ANSWER. (5pts each) Write the word or phrase that best completes each statement or answers the question. Write your answer in the space provided. No partial credit.

Determine the trig substitution to evaluate this integral.

11) $\int \frac{1}{t^2\sqrt{8 - t^2}}\, dt$ 11) _____

Determine the partial fractions decomposition to evaluate this integral.

12) $\int \frac{8x^2 + x + 63}{x^3 + 9x}\, dx$ 12) _____

Solve the problem.

13) Estimate the minimum number of subintervals needed to approximate the integral 13) _____

$$\int_2^4 \frac{1}{x - 1} dx$$

with an error of magnitude less than 10^{-4} using Simpson's Rule.

Determine whether the improper integral converges or diverges.

14) $\int_{-1}^{1} \frac{1}{x \ln |x|} dx$ 14) _____

ESSAY. (6pts each) Show all work to justify your answer. Answers with no work or insufficient work will receive no credit. Partial credit may be given.

Solve the problem.

15) Estimate the minimum number of subintervals needed to approximate the integral

$$\int_2^4 \frac{1}{x - 1} dx$$

with an error of magnitude less than 10^{-4} using Simpson's Rule.

Evaluate the integral.

16) $\int 7 \sec^4 x \, dx$

Find the values of x for which the geometric series converges.

17) $\sum_{n=0}^{\infty} (-1)^n \left(\frac{x - 3}{7} \right)^n$

Use the integral test to determine whether the series converges.

18) $\sum_{n=1}^{\infty} \frac{\cos 1/n}{n^2}$

Use the limit comparison test to determine if the series converges or diverges.

19) $\sum_{n=1}^{\infty} \frac{4\sqrt{n}}{10n^{3/2} - 7n + 2}$

Use the Comparison Test to determine if the series converges or diverges.

20) $\sum_{n=1}^{\infty} \left(\frac{n}{9n + 8} \right)^n$