

Math 104-004 – Rimmer

Practice Exam 5

1. If your goal is to approximate $e^{1/2}$ by using the Maclaurin series up to the quadratic term, the best estimate you can achieve for the error is that it must be less than or equal to _____.

The interval used will be $[-3, 3]$

- | | |
|---------------------------|----------------------|
| (A) $\frac{e^{-1/2}}{64}$ | (E) $\frac{1}{16}$ |
| (B) $\frac{27e^3}{2}$ | (F) $\frac{3}{2}$ |
| (C) $\frac{e^{-3}}{6}$ | (G) $\frac{9e^3}{2}$ |
| (D) $\frac{e^3}{48}$ | (H) $\frac{1}{4}$ |

2. Estimate

$$\int_0^1 \sin(x^2) dx$$

With an error less than 0.001.

Explain for full credit.

- | | |
|---------------------|-------------------------|
| (A) $\frac{1}{64}$ | (E) $\frac{101}{124}$ |
| (B) $\frac{13}{42}$ | (F) $\frac{5}{8}$ |
| (C) $\frac{17}{36}$ | (G) $\frac{11}{24}$ |
| (D) $\frac{48}{31}$ | (H) $\frac{2867}{9248}$ |

3. Compute

$$\lim_{x \rightarrow 0} \frac{1 - \cos(2x)}{x(e^{3x} - 1)}$$

by using Taylor series where appropriate.

- | | |
|--------------|-------------------|
| (A) 0 | (E) $\frac{1}{3}$ |
| (B) ∞ | (F) $\frac{2}{3}$ |
| (C) 1 | (G) $\frac{1}{2}$ |
| (D) 2 | (H) $\frac{1}{4}$ |

4.

Find the third degree Taylor polynomial for $f(x) = \sqrt[3]{x}$ centered at $x = 1$.

5. The interval of convergence of the power series

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

is

- (A) $(-1, 2]$ (E) $(1, 2]$
(B) $(-1, 2)$ (F) $[1, 2]$
(C) $(1, 2)$ (G) $[-1, 2]$
(D) $[1, 2)$ (H) $(-\infty, \infty)$

6. Evaluate the limit using series.

$$\lim_{x \rightarrow 0} \frac{\frac{x^2}{(1-x)^2}}{4x-1+e^{-4x}}$$

- A) $\frac{1}{8}$ B) $\frac{1}{16}$ C) $\frac{1}{4}$ D) 8
E) $\frac{1}{2}$ F) 1 G) 2 H) 16

7. Find the coefficient of the x^4 term of the Maclaurin series for

$$f(x) = xe^{-2x}$$

- A) $\frac{2}{3}$ B) $\frac{4}{3}$ C) $\frac{-8}{3}$ D) $-\frac{2}{3}$
E) $-\frac{4}{3}$ F) -2 G) 2 H) -1

Answers:

1. G 2. B 3. F

4. $T_3 = 1 + \frac{1}{3}(x-1) - \frac{1}{9}(x-1)^2 + \frac{5}{81}(x-1)^3$

5. E 6. A 7. E