■ 1. Find $\sum_{n=2}^{\infty} \frac{3}{4^n}$.

A 1

B $\frac{1}{4}$

C $\frac{3}{4}$

D Divergent

■ 2. The nth term test can be used to determine divergence for which of the following series?

I. $\sum_{n=1}^{\infty} \frac{e^n}{n^2}$

II. $\sum_{n=1}^{\infty} e^{-n}$

III. $\sum_{n=1}^{\infty} \frac{5n^2 + 3n}{2n^2 - 7}$

A III only

B I and III

C II and III

D I, II, and III

■ 3. Let f be a positive, continuous, and decreasing function such that $a_n = f(x)$. If $\sum_{n=0}^{\infty} a_n$ converges to k, which one of the following must be true?

A $\int_1^{\infty} f(x)\ dx = k$

B $\int_1^{\infty} f(x)\ dx$ diverges

C $\int_1^\infty f(x)\, dx$ converges

D None of the above

■ 4. Which of the following is not a p-series?

A $\sum_{n=1}^{\infty} \frac{5}{4^n}$

B $\sum_{n=1}^{\infty} \frac{1}{n}$

C $\sum_{n=1}^{\infty} \frac{5}{n^4}$

D $\sum_{n=1}^{\infty} n^{-3}$

■ 5. Given the series $\sum_{n=1}^{\infty} \frac{n^2(4^n)}{n!}$, which of the following inequalities would result if the ratio test was applied to determine that the series converges?

A $\lim_{n\to\infty} \frac{4}{n+1} < 1$

B $\lim_{n\to\infty} \frac{4(n+1)}{n^2} < 1$

C $\lim_{n\to\infty} \frac{n+1}{4} > 1$

D $\lim_{n\to\infty} \frac{n^2}{4(n+1)} > 1$

■ 6. Which of the following conditionally converges?

A $\sum_{n=1}^{\infty} \frac{\sin \pi n}{n^3}$

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

C $\sum_{n=1}^{\infty} \frac{\cos(\pi n)}{n}$

D $\sum_{n=1}^{\infty} \frac{(-1)^n}{3^n}$

■ 7. Let $f(x) = x^2$. What is the approximation for $f(1.2)$ found by using the second-degree Taylor polynomial for f about $x = 1$?

A 1.44

B 1.24

C 0.44

D 0.24

■ 8. What is the coefficient of the x^3 term of the Maclaurin polynomial for $f(x) = \frac{x^2}{e^x}$?

A 1

B -1

C $\frac{1}{3!}$

D $-\frac{1}{3!}$

■ 9. The Maclaurin series for $\cos x$ is $\cos x = 1 - \frac{x^2}{2} + \frac{x^4}{4!} - \frac{x^6}{6!} + \ldots + \frac{(-1)^n x^{2n}}{(2n)!} + \ldots$. The continuous function f is defined by $f(x) = x \cos x$. The function f has derivative of all orders at $x = 0$.

a. Write the first four nonzero terms and the general term for the Taylor series for $f(x)$ centered at $c = 0$.

b. Use the seventh degree Taylor polynomial to approximate $f(0.3)$.

c. Use the Lagrange error bound to show that $|f(0.3) - P(0.3)| < \frac{1}{1{,}000}$.

d. Use the ratio test to find the interval of convergence for the Taylor series found in part a.