


Put answers on a separate piece of paper. Label each Section. Show all work for Free Response questions.

Quick Quiz for AP* Preparation: Sections 9.1–9.3

 You should solve the following problems without using a graphing calculator.

1. **Multiple Choice** Which of the following is the sum of the

$$\text{series } \sum_{n=0}^{\infty} \frac{\pi^n}{e^{2n}}?$$

- (A) $\frac{e}{e - \pi}$ (B) $\frac{\pi}{\pi - e}$ (C) $\frac{\pi}{\pi - e^2}$
 (D) $\frac{e^2}{e^2 - \pi}$ (E) The series diverges.

2. **Multiple Choice** Assume that f has derivatives of all orders for all real numbers x , $f(0) = 2$, $f'(0) = -1$, $f''(0) = 6$, and $f'''(0) = 12$. Which of the following is the third order Taylor polynomial for f at $x = 0$?

- (A) $2 - x + 3x^2 + 2x^3$ (B) $2 - x + 6x^2 + 12x^3$
 (C) $2 - \frac{1}{2}x + 3x^2 + 2x^3$ (D) $-2 + x - 3x^2 - 2x^3$
 (E) $2 - x + 6x^2$

3. **Multiple Choice** Which of the following is the Taylor series generated by $f(x) = 1/x$ at $x = 1$?

- (A) $\sum_{n=0}^{\infty} (x - 1)^n$ (B) $\sum_{n=0}^{\infty} (-1)^n x^n$
 (C) $\sum_{n=0}^{\infty} (-1)^n (x + 1)^n$ (D) $\sum_{n=0}^{\infty} (-1)^n \frac{(x - 1)^n}{n!}$
 (E) $\sum_{n=0}^{\infty} (-1)^n (x - 1)^n$


4. **Free Response** Let f be the function defined by

$$f(x) = \sum_{n=0}^{\infty} 2 \left(\frac{x+2}{3} \right)^n$$

for all values of x for which the series converges.

- (a) Find the interval of convergence for the series.
 (b) Find the function that the series represents.

Quick Quiz for AP* Preparation: Sections 9.4 and 9.5

 You may use a graphing calculator to solve the following problems.

1. **Multiple Choice** Which of the following series converge?

I. $\sum_{n=0}^{\infty} \frac{2}{n^2 + 1}$ II. $\sum_{n=1}^{\infty} \frac{2^n - 1}{3^n + 1}$ III. $\sum_{n=1}^{\infty} \frac{\sqrt[n]{n}}{n}$

- (A) I only (B) II only (C) III only
 (D) II & III only (E) I & II only

2. **Multiple Choice** Which of the following is the sum of the telescoping series

$$\sum_{n=1}^{\infty} \frac{2}{(n+1)(n+2)}?$$

- (A) 1/3 (B) 1/2 (C) 3/5 (D) 2/3 (E) 1

3. **Multiple Choice** Which of the following describes the behavior of the series

$$\sum_{n=1}^{\infty} (-1)^n \frac{\ln n}{n}?$$

- I. converges II. diverges III. converges conditionally
 (A) I only (B) II only (C) III only
 (D) I & III only (E) II & III only


4. **Free Response** Consider the power series

$$\sum_{n=0}^{\infty} \frac{n(2x+3)^n}{n+2}.$$

- (a) Find all values of x for which the series converges absolutely. Justify your answer.
 (b) Find all values of x for which the series converges conditionally. Justify your answer.

Ch 9 Review Section

AP* Examination Preparation

 You may use a graphing calculator to solve the following problems.

71. Let $f(x) = \frac{1}{x+1}$.
- Find the first three terms and the general term for the Taylor series for f at $x = 1$.
 - Find the interval of convergence for the series in part (a). Justify your answer.
 - Find the third-order Taylor polynomial for f at $x = 1$, and use it to approximate $f(0.5)$.
72. Let $f(x) = \sum_{n=0}^{\infty} \frac{nx^n}{2^n}$.
- Find the interval of convergence of the series. Justify your answer.
 - Show that the first nine terms of the series are sufficient to approximate $f(-1)$ with an error less than 0.01.
73. Let f be a function that has derivatives of all orders for all real numbers. Assume that $f(0) = -1$, $f'(0) = 2$, $f''(0) = -3$, and $f'''(0) = 4$.
- Write the linearization for f at $x = 0$.
 - Write the quadratic approximation for f at $x = 0$.
 - Write the third degree Taylor approximation $P_3(x)$ for f at $x = 0$.
 - Use $P_3(x)$ to approximate $f(0.7)$.