Instructions

- Read the Series Review Notes.
- Write all Taylor polynomials in standard form.
- Simplify coefficients as far as possible.
- Do not write any terms that have zero coefficient.

1. Question Details

Are each of the following a **Sequence, Finite Sum, Series, Polynomial, or Power Series**.

---Select---

- $5 - 7x^2 + 9x^4$
- $\sum_{n=2}^{20} \frac{2^n}{n!}$
- $0, \frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \ldots$
- $\sum_{n=2}^{\infty} \frac{x^n}{2^n+1}$
- $1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \ldots$

2. Question Details

Are each of the following a **Sequence, Finite Sum, Series, Polynomial, or Power Series**.

---Select---

- $\sum_{n=2}^{\infty} \frac{1}{\ln(n)}$
- $1 - \frac{x^2}{2} + \frac{x^4}{4} - \frac{x^6}{720} + \ldots$
- $\frac{(-1)^n}{n^2+1}$
- $\sum_{n=0}^{20} \frac{x^n}{n!}$
3. The Series Review Notes list three standard methods for computing a Taylor polynomial.

Which method is best suited for the Taylor expansion of $e^{-x^2}$ centered at $x = 0$?

- Substitution in a known formula.
- Binomial expansion, possibly followed by substitution.
- Compute one coefficient at a time using derivatives.

Find the 6th degree Taylor polynomial for $e^{-x^2}$ centered at $x = 0$.

$$e^{-x^2} \approx \boxed{\text{polynomial}}$$

4. The Series Review Notes list three standard methods for computing a Taylor polynomial.

Which method is best suited for the Taylor expansion of $\ln(x + 1)$ centered at $x = 0$?

- Compute one coefficient at a time using derivatives.
- Binomial expansion, possibly followed by substitution.
- Substitution in a known formula.

Find the 4th degree Taylor polynomial for $\ln(x + 1)$ centered at $x = 0$.

$$\ln(x + 1) \approx \boxed{\text{polynomial}}$$

5. The Series Review Notes list three standard methods for computing a Taylor polynomial.

Which method is best suited for the Taylor expansion of $(1 + x)^{-1/2}$ centered at $x = 0$?

- Binomial expansion, possibly followed by substitution.
- Compute one coefficient at a time using derivatives.
- Substitution in a known formula.

Find the 3rd degree Taylor polynomial for $(1 + x)^{-1/2}$ centered at $x = 0$.

$$(1 + x)^{-1/2} \approx \boxed{\text{polynomial}}$$

6. Find the 3rd degree Taylor polynomial, centered at $x = 0$, for

$$\cos(\sqrt{x}) \approx \boxed{\text{polynomial}}$$
7. Find the 2nd degree Taylor polynomial, centered at \( x = 0 \), for
\[
\frac{1}{\sqrt{1 + 2x}} \approx \ldots
\]

8. Find the 6th degree Taylor polynomial, centered at \( x = 0 \), for
\[
\frac{1}{1 - x^2} \approx \ldots
\]

9. Suppose \( f(x) \) is a function such that
\[
\begin{align*}
    f(2) & = -3 \\
    f'(2) & = 3 \\
    f''(2) & = 8 \\
    f^{(3)}(2) & = 12 \\
    f^{(4)}(2) & = 0 \\
    f^{(5)}(2) & = -10
\end{align*}
\]
Find the 5th degree Taylor polynomial for \( f(x) \) centered at \( x = 2 \).
\[
T_5(x) = \ldots
\]