Error

83. The Taylor Series for lnx, centered at x = 1, is $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}(x-1)^n}{n}$. Let f be the function given by the sum of the first three nonzero terms of this series. The maximum value of $|\ln x - f(x)|$ for $.3 \le x \le 1.7$ is

(A) .030 (B) .039 (C) .145 (D) .153 (E) .529

<u>2010 BC #6</u>

The Taylor series $g(x) = 1 - \frac{x}{2!} + \frac{x^3}{3 \cdot 4!} - \frac{x^5}{5 \cdot 6!}$ about x = 0, evaluated at x = 1, is an alternating series with individual terms that decrease in absolute value to 0. Use the third degree polynomial to Estimate the value of g(1). Explain why this estimate differs from the actual value of g(1) by less than $\frac{1}{6!}$.

<u>2012 #6</u>

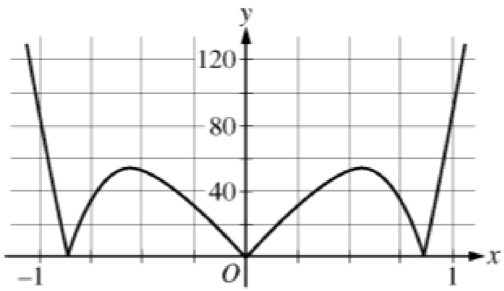
The function g has derivatives of all orders, and the Maclaurin series for g is

$$\sum_{n=0}^{\infty} (-1)^n \frac{x^{2n+1}}{2n+3} = \frac{x}{3} - \frac{x^3}{5} + \frac{x^5}{7} - \cdots$$

a) The Maclaurin series for g evaluated at x = $\frac{1}{2}$ is an alternating series whose terms decrease in absolute value to 0. The approximation for $g\left(\frac{1}{2}\right)$ using the first two nonzero terms of this series is $\frac{17}{120}$. Show that this approximation differs from $g\left(\frac{1}{2}\right)$ by less than $\frac{1}{200}$.

2011 BC6

Let $f(x)=\sin\left(x^2\right)+\cos x$. The graph of $y=\left|f^{(5)}(x)\right|$ is shown.



Graph of $y=\left|f^{(5)}(x)\right|$

Let $P_4(x)$ be the fourth degree Taylor polynomial for f about x = 0. Using information from the graph of $y=\left|f^{(5)}(x)\right|$, shown above, show that $\left|P_4\left(\frac{1}{4}\right)-f\left(\frac{1}{4}\right)\right|<\frac{1}{3000}$.

2008 BC 6 Form B

6. The first 4 nonzero terms of the Taylor Series for $\ln(1 + x^2)$ are
$x^2-\frac{1}{2}x^4+\frac{1}{3}x^6-\frac{1}{4}x^8$

d. Use this series to find a rational number A such that $\left|A-\ln\left(\frac{5}{4}\right)\right|<\frac{1}{100}$. Justify your answer.

2007 BC6

6. The first four nonzero terms of the Taylor series for $\int_0^x e^{-t^2}\,dt$ about x = 0 is
$x-\frac{x^3}{3}+\frac{x^5}{10}-\frac{x^7}{42}$.

c. Find $\int_0^{1/2} e^{-t^2}\,dt$ using the first 2 terms.

d. Explain why the estimate found in part c, differs from the actual value of $\int_0^{1/2} e^{-t^2}\,dt$ by less than $\frac{1}{200}$.

2006 FormB BC6

The function f is defined by $f(x)=\dfrac{1}{1+x^3}$.

c. Find the first four nonzero terms and the general term for the Maclaurin series representing $\int_0^x f(t)dt$.

D. Use the first three nonzero terms of the infinite series found in part (C) to approximate $\int_0^{1/2} f(t)dt$. What are the properties of the terms of the series representing $\int_0^{1/2} f(t)dt$ that this approximation is within $\dfrac{1}{10000}$ of the exact value of the integral.