More Series Review

1993 BC5 (no calculator)

Let *f* be the function defined by 

a) Write the first four nonzero terms and the general term for the Taylor series expansion of *f(x)* about *x = 0*.

b) Use the result from part a) to write the first three nonzero terms and the general term of the series expansion about *x = 0* for 

c) For the function *g* in part b), find  and use it to show that 

 1994 BC5 (no calculator)

Let *f* be the function defined by 

a) Write the first four nonzero terms and the general term for the Taylor series expansion of *f(x)* about *x = 0*.

b) Find the interval of convergence of the power series for *f(x)* about *x = 0*. Show the analysis that leads to your conclusion.

c) Let *g* be the function given by the sum of the first four nonzero terms of the power series for *f(x)* about *x = 0*. Show that  for 

1995 BC4 (calculator allowed)

Let *f* be a function that has derivatives for all orders for all real numbers. Assume that  and 

a) Write the second degree Taylor polynomial for *f* about *x = 1* and use it to approximate *f(0.7)*.

b) Write the third degree Taylor polynomial for *f* about *x = 1* and use it to approximate *f(1.2)*.

c) Write the second degree Taylor polynomial for  the derivative of *f* about *x = 1* and use it to approximate 

2000 BC3 (no calculator)

The Taylor series about *x = 5* for a certain function *f* converges to *f(x)* in the interval of convergence. The *n*th derivative of *f* is given by  and 

a) Write the third-degree Taylor polynomial for *f* about *x = 5*.

b) Find the radius of convergence of the Taylor series for *f* about *x = 5*.

c) Show that the sixth degree polynomial for *f* about *x = 5* approximates *f(6)* with error less than 

2002B BC6 (no calculator)

The Maclaurin series for  is  with interval of convergence 

a) Find the Maclaurin series for  and determine the interval of convergence.

b) Find the value of 

c) Give a value of *p* such that  converges, but  diverges. Give reasons why your value of *p* is correct.

d) Give a value of *p* such that  diverges, but  converges. Give reasons why your value of *p* is correct.

1978 BC5 (no calculator)

The power series  has an interval of convergence  Let  be its sum.

a) Find  and 

b) Justify that the interval of convergence is 

1979 BC4 (no calculator)

Let *f* be the function 

a) Write the first four terms and the general term of the Taylor series expansion for *f(x)* about *x = 0*.

b) What is the interval of convergence for the series found in part a)? Show the work that justifies your answer.

c) Find the value of  at  How many terms are of the series are required to approximate  with an error not to exceed 1%. Justify your answer.

1980 BC3 (no calculator)

a) Determine whether the series  diverges or converges. Justify your answer.

b) If *S* is the series formed by multiplying the *n*th in *A* by  write an expression using summation notation for *S*.

c) Determine whether the series *S* found in part b) converges or diverges. Justify your answer.

1981 BC3 (no calculator)

Let *S* be the series  where 

a) Find the value to which *S* converges when *t = 1*.

b) Determine the values of *t* for which *S* converges. Justify your answer.

c) Find all values of *t* that make the sum of the series *S* greater than 10.

1982 BC5 (no calculator)

a) Write the first four terms and the general term for the Taylor series expansion about *x = 0* for 

b) For what values of *x* does the series in part a) converge?

c) Estimate the error in evaluating  by using on the first five nonzero terms.

d) Use the result in part a) to determine the logarithmic function whose Taylor series is 

1983 BC5 (no calculator)

Consider the power series  where  and  for 

a) Find the first four terms and the general term of the series.

b) For what values of *x* does the series converge?

c) If  find the value of 

2005B BC3 (no calculator)

The Taylor series about *x = 0* for a certain function converges to *f(x)* for all *x* in the interval of convergence. The *n*th derivative of *f* at *x = 0* is given by  for 

The graph has a horizontal tangent line at *x = 0,* and *f(0) = 6*.

a) Determine whether *f* has a relative maximum, a relative minimum, or neither at *x = 0*. Justify your answer.

b) Write the third degree Taylor polynomial for *f* about *x = 0.*

c) Find the radius of convergence of the Taylor series for *f* about *x = 0*. Show the work that leads to your answer.