

Multiple-Choice Test

Chapter 01.07 Taylors Series Revisited

- The coefficient of the x^5 term in the Maclaurin polynomial for $\sin(2x)$ is
 - 0
 - 0.00833333
 - 0.016667
 - 0.26667
- Given $f(3) = 6$, $f'(3) = 8$, $f''(3) = 11$, and that all other higher order derivatives of $f(x)$ are zero at $x = 3$, and assuming the function and all its derivatives exist and are continuous between $x = 3$ and $x = 7$, the value of $f(7)$ is
 - 38.000
 - 79.500
 - 126.00
 - 331.50
- Given that $y(x)$ is the solution to $\frac{dy}{dx} = y^3 + 2$, $y(0) = 3$ the value of $y(0.2)$ from a second order Taylor polynomial is
 - 4.400
 - 8.800
 - 24.46
 - 29.00
- The series $\sum_{n=0}^{\infty} (-1)^n \frac{x^{2n}}{(2n)!} 4^n$ is a Maclaurin series for the following function
 - $\cos(x)$
 - $\cos(2x)$
 - $\sin(x)$
 - $\sin(2x)$

5. The function

$$\operatorname{erf}(x) = \frac{2}{\sqrt{\pi}} \int_0^x e^{-t^2} dt$$

is called the error function. It is used in the field of probability and cannot be calculated exactly for finite values of x . However, one can expand the integrand as a Taylor polynomial and conduct integration. The approximate value of $\operatorname{erf}(2.0)$ using the first three terms of the Taylor series around $t = 0$ is

- (A) -0.75225
 - (B) 0.99532
 - (C) 1.5330
 - (D) 2.8586
6. Using the remainder of Maclaurin polynomial of n^{th} order for $f(x)$ defined as

$$R_n(x) = \frac{x^{n+1}}{(n+1)!} f^{(n+1)}(c), \quad n \geq 0, \quad 0 \leq c \leq x$$

the least order of the Maclaurin polynomial required to get an absolute true error of at most 10^{-6} in the calculation of $\sin(0.1)$ is (do not use the exact value of $\sin(0.1)$ or $\cos(0.1)$ to find the answer, but the knowledge that $|\sin(x)| \leq 1$ and $|\cos(x)| \leq 1$).

- (A) 3
- (B) 5
- (C) 7
- (D) 9

[Complete solution](#)