
6. The Maclaurin series for a function g is given by

$$\sum_{n=0}^{\infty} 2\left(\frac{-x}{5}\right)^n = 2 - \frac{2}{5}x + \frac{2}{25}x^2 - \frac{2}{125}x^3 + \frac{2}{625}x^4 - \dots + 2\left(\frac{-x}{5}\right)^n + \dots \text{ and converges to } g(x) \\ \text{for } |x| < 5.$$

Part A

For $x > 0$, the Maclaurin series for g is an alternating geometric series. Find $g(3)$. Show the work that leads to your answer.

Part B

The function f is defined by $f(x) = g'(x)$. Write the first four nonzero terms of the Maclaurin series for f .

Part C

The second-degree Taylor polynomial for f about $x = 0$ is used to approximate $f\left(\frac{5}{2}\right)$ as $-\frac{3}{10}$, where f is the function defined in part B. Justify that $\left|f\left(\frac{5}{2}\right) - \left(-\frac{3}{10}\right)\right| \leq \frac{1}{5}$.

Part D

The function h is defined by $h(x) = 25g(x) - 2e^x$.

- Write the first three nonzero terms of the Maclaurin series for e^x .
- Write the first three nonzero terms of the Maclaurin series for h .

STOP
END OF EXAM