

1. Find a power series representation and determine the interval of convergence for $f(x) = \frac{2x}{3x^3 + 1}$
2. Find a power series representation and determine the interval of convergence for $f(x) = \frac{x^2}{x^3 + 5}$
3. Find a power series representation and determine the interval of convergence for $f(x) = \frac{x + 2}{x + 3}$
4. Express the function as the sum of a power series by first using partial fractions. Find the interval of convergence. $f(x) = \frac{6x + 10}{x^2 + 4x + 3}$
5. Find a power series representation and determine the radius of convergence for $f(x) = \left(\frac{x}{x + 1}\right)^2$
6. Find a power series representation and determine the radius of convergence for $f(x) = \left(\frac{\sqrt{x}}{3 - x}\right)^4$
7. Find a power series representation and determine the radius of convergence for $f(x) = \tan^{-1}(x^2)$
8. Evaluate the integral as a power series: $\int \frac{x}{1 + x^6} dx$
9. Find a power series representation and determine the interval of convergence for $f(x) = x \tan^{-1} x$
10. Evaluate the sum $2 \cdot 1x^2 + 3 \cdot 2x^3 + 4 \cdot 3x^4 + 5 \cdot 4x^5 + \dots = \sum_{n=2}^{\infty} n(n - 1)x^n$.