

Calculus 2 Workbook

Power series



POWER SERIES REPRESENTATION

■ 1. Find the power series representation of the function.

$$f(x) = \frac{3x}{7 + x^2}$$

■ 2. Find the power series representation of the function.

$$f(x) = \frac{5}{4 - 6x}$$

■ 3. Find the power series representation of the function.

$$f(x) = \frac{4}{x^2 - x^3}$$

■ 4. Find the power series representation of the function.

$$f(x) = \frac{5x^2}{1+x^3}$$

■ 5. Find the power series representation of the function.

$$f(x) = \frac{x}{8 - x}$$

POWER SERIES MULTIPLICATION

■ 1. Use power series multiplication to find the first four non-zero terms of the Maclaurin series.

$$y = \cos(3x)e^{3x}$$

■ 2. Use power series multiplication to find the first four non-zero terms of the Maclaurin series.

$$y = \arctan(2x)\sin x$$

■ 3. Use power series multiplication to find the first four non-zero terms of the Maclaurin series.

$$y = e^{-2x} \cos(2x)$$

■ 4. Use power series multiplication to find the first four non-zero terms of the Maclaurin series.

$$y = e^{5x} \ln(1 + 3x)$$

■ 5. Use power series multiplication to find the first four non-zero terms of the Maclaurin series.

$$y = e^{3x} \cdot \frac{3}{1 - x}$$



POWER SERIES DIVISION

■ 1. Use power series division to find the first four non-zero terms of the Maclaurin series.

$$y = \frac{e^{3x}}{x^2}$$

■ 2. Use power series division to find the first four non-zero terms of the Maclaurin series.

$$y = \frac{6x}{\ln(1+6x)}$$

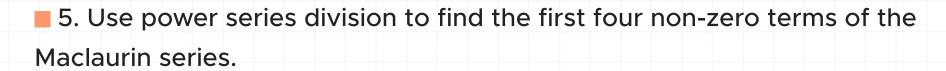
■ 3. Use power series division to find the first four non-zero terms of the Maclaurin series.

$$y = \frac{\cos(2x)}{2x^3}$$

■ 4. Use power series division to find the first four non-zero terms of the Maclaurin series.

$$y = \frac{\sin(3x)}{3x^2}$$





$$y = \frac{\arctan(4x)}{4x^2}$$



POWER SERIES DIFFERENTIATION

■ 1. Differentiate to find the power series representation of the function.

$$f(x) = \frac{5}{\left(3 - x\right)^2}$$

■ 2. Differentiate to find the power series representation of the function.

$$f(x) = \frac{3}{\left(4+x\right)^2}$$

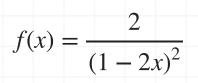
■ 3. Differentiate to find the power series representation of the function.

$$f(x) = \frac{1}{(-5 - x)^2}$$

■ 4. Differentiate to find the power series representation of the function.

$$f(x) = \frac{3}{(6 - 3x)^2}$$

■ 5. Differentiate to find the power series representation of the function.





RADIUS OF CONVERGENCE

■ 1. Find the radius of convergence of the series.

$$\sum_{n=0}^{\infty} \frac{(-1)^n x^{2n}}{4 \cdot 2^{2n}}$$

■ 2. Find the radius of convergence of the series.

$$\sum_{n=0}^{\infty} \frac{(-1)^n x^{2n+1}}{(2n+1)!}$$

■ 3. Find the radius of convergence of the series.

$$\sum_{n=0}^{\infty} \frac{x^n}{n+4}$$

■ 4. Find the radius of convergence of the series.

$$\sum_{n=0}^{\infty} \frac{3^n (x+2)^n}{n!}$$

■ 5. Find the radius of convergence of the series.

\sim	$3^n(x+2)^n$
n=0	n+1



INTERVAL OF CONVERGENCE

■ 1. Find the interval of convergence of the series.

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

■ 2. Find the interval of convergence of the series.

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

ESTIMATING DEFINITE INTEGRALS

■ 1. Evaluate the definite integral as a power series, using the first four terms.

$$\int_0^2 \frac{24}{x^2 + 4} \ dx$$

■ 2. Evaluate the definite integral as a power series, using the first four terms.

$$\int_0^1 3x \cos(x^3) \ dx$$

■ 3. Evaluate the definite integral as a power series, using the first four terms.

$$\int_0^1 4e^{x^2} dx$$



ESTIMATING INDEFINITE INTEGRALS

■ 1. Evaluate the indefinite integral as a power series.

$$\int x^2 \sin(x^2) \ dx$$

■ 2. Evaluate the indefinite integral as a power series.

$$\int \ln(1+2x) \ dx$$

■ 3. Evaluate the indefinite integral as a power series.

$$\int x^2 \cos(x^3) \ dx$$



BINOMIAL SERIES

■ 1. Use a binomial series to expand the function as a power series.

$$f(x) = (3+x)^5$$

■ 2. Use a binomial series to expand the function as a power series.

$$f(x) = (6 - x)^4$$

■ 3. Use a binomial series to expand the function as a power series.

$$f(x) = (-4 + x)^5$$

■ 4. Use a binomial series to expand the function as a power series.

$$f(x) = (7 - x)^6$$

■ 5. Use a binomial series to expand the function as a power series.

$$f(x) = (8+x)^7$$



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