

2022 Calculus BC Derivative and Integrals of Power Series

Lesson 347 | Calculus BC | Differentiating power series

<https://www.youtube.com/watch?v=lp2bKINOszk>

Original practice aligned to the saved video title.

Name: _____ Date: _____ Show your reasoning.

01

Use the geometric series for $1/(1-9x)$ to derive a power series for $1/(1-9x)^2$ and its convergence interval.

02

Use the geometric series for $1/(1-8x)$ to derive a power series for $1/(1-8x)^2$ and its convergence interval.

03

Use the geometric series for $1/(1-10x)$ to derive a power series for $1/(1-10x)^2$ and its convergence interval.

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04

Use the geometric series for $1/(1-6x)$ to derive a power series for $1/(1-6x)^2$ and its convergence interval.

05

Use the geometric series for $1/(1-3x)$ to derive a power series for $1/(1-3x)^2$ and its convergence interval.

06

Use the geometric series for $1/(1-5x)$ to derive a power series for $1/(1-5x)^2$ and its convergence interval.

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01

Use the geometric series for $1/(1-9x)$ to derive a power series for $1/(1-9x)^2$ and its convergence interval.

$1/(1-9x) = \sum_{m=0}^{\infty} 9^m x^m$ for $|x| < 1/9$. Differentiate and divide by 9:

$1/(1-9x)^2 = \sum_{m=0}^{\infty} (m+1)9^m x^m$. Radius $1/9$; both endpoints diverge because terms fail to tend to zero. Interval $(-1/9, 1/9)$.

02

Use the geometric series for $1/(1-8x)$ to derive a power series for $1/(1-8x)^2$ and its convergence interval.

$1/(1-8x) = \sum_{m=0}^{\infty} 8^m x^m$ for $|x| < 1/8$. Differentiate and divide by 8:

$1/(1-8x)^2 = \sum_{m=0}^{\infty} (m+1)8^m x^m$. Radius $1/8$; both endpoints diverge because terms fail to tend to zero. Interval $(-1/8, 1/8)$.

03

Use the geometric series for $1/(1-10x)$ to derive a power series for $1/(1-10x)^2$ and its convergence interval.

$1/(1-10x) = \sum_{m=0}^{\infty} 10^m x^m$ for $|x| < 1/10$. Differentiate and divide by 10:

$1/(1-10x)^2 = \sum_{m=0}^{\infty} (m+1)10^m x^m$. Radius $1/10$; both endpoints diverge because terms fail to tend to zero. Interval $(-1/10, 1/10)$.

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04

Use the geometric series for $1/(1-6x)$ to derive a power series for $1/(1-6x)^2$ and its convergence interval.

$1/(1-6x) = \sum_{m=0}^{\infty} 6^m x^m$ for $|x| < 1/6$. Differentiate and divide by 6:

$1/(1-6x)^2 = \sum_{m=0}^{\infty} (m+1)6^m x^m$. Radius $1/6$; both endpoints diverge because terms fail to tend to zero. Interval $(-1/6, 1/6)$.

05

Use the geometric series for $1/(1-3x)$ to derive a power series for $1/(1-3x)^2$ and its convergence interval.

$1/(1-3x) = \sum_{m=0}^{\infty} 3^m x^m$ for $|x| < 1/3$. Differentiate and divide by 3:

$1/(1-3x)^2 = \sum_{m=0}^{\infty} (m+1)3^m x^m$. Radius $1/3$; both endpoints diverge because terms fail to tend to zero. Interval $(-1/3, 1/3)$.

06

Use the geometric series for $1/(1-5x)$ to derive a power series for $1/(1-5x)^2$ and its convergence interval.

$1/(1-5x) = \sum_{m=0}^{\infty} 5^m x^m$ for $|x| < 1/5$. Differentiate and divide by 5:

$1/(1-5x)^2 = \sum_{m=0}^{\infty} (m+1)5^m x^m$. Radius $1/5$; both endpoints diverge because terms fail to tend to zero. Interval $(-1/5, 1/5)$.