

Watch. Practice. Understand. | Lesson 347

2022 Calculus BC Derivative and Integrals of Power Series

Watch the matching video: <https://www.youtube.com/watch?v=lp2bKINOsZk>

Practice focus: Power series and intervals of convergence

Original extra practice matched to the listed lesson topic.

Name: _____ Date: _____ Show your reasoning and check units.

01 Find radius and interval of convergence of $\sum x^n, n \geq 0$.

02 Find radius and interval for $\sum (x-2)^n/(n3^n), n \geq 1$.

03 Write a power series for $1/(1-x)^2$ valid for $|x| < 1$.

04 Integrate the geometric series from 0 to x to obtain a series for $-\ln(1-x)$.

Worked answers | Lesson 347

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Practice focus: Power series and intervals of convergence

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01 Find radius and interval of convergence of $\sum x^n, n \geq 0$.

Geometric series converges for $|x| < 1$; at ± 1 terms fail to approach 0. Radius 1, interval $(-1, 1)$.

02 Find radius and interval for $\sum (x-2)^n / (n3^n), n \geq 1$.

Ratio gives $|x-2| < 3$. At $x=-1$: alternating harmonic converges; at $x=5$: harmonic diverges. Radius 3; interval $[-1, 5)$.

03 Write a power series for $1/(1-x)^2$ valid for $|x| < 1$.

Differentiate geometric series: $\sum_{n=1}^{\infty} n x^{(n-1)}$.

04 Integrate the geometric series from 0 to x to obtain a series for $-\ln(1-x)$.

Termwise integration gives $\sum x^{(n+1)} / (n+1), n \geq 0$, for $|x| < 1$. This is $-\ln(1-x)$.