

Watch. Practice. Understand. | Lesson 320

Calculus 7 8 Improper Integrals

Watch the matching video: <https://www.youtube.com/watch?v=AweZ0-NTdns>

Practice focus: Improper integrals

Original extra practice matched to the listed lesson topic.

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

01 Evaluate the integral of $1/x^2$ from 1 to infinity.

02 Does the integral of $1/x$ from 1 to infinity converge?

03 Evaluate the integral of $1/\sqrt{x}$ from 0 to 1.

04 For which p does the integral of $1/x^p$ from 1 to infinity converge?

Worked answers | Lesson 320

Calculus 7 8 Improper Integrals

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Practice focus: Improper integrals

Original extra practice matched to the listed lesson topic.

01 Evaluate the integral of $1/x^2$ from 1 to infinity.

Limit as $b \rightarrow \infty$ of $[-1/x]_1^b = 1$. Convergent.

02 Does the integral of $1/x$ from 1 to infinity converge?

No. Partial integral $\ln b$ grows without bound; it diverges.

03 Evaluate the integral of $1/\sqrt{x}$ from 0 to 1.

Limit as $a \rightarrow 0^+$ of $[2\sqrt{x}]_a^1 = 2$. Convergent despite the unbounded integrand.

04 For which p does the integral of $1/x^p$ from 1 to infinity converge?

For $p > 1$; antiderivative endpoint at infinity is finite only then. At $p = 1$ it diverges logarithmically.