

Watch. Practice. Understand. | Lesson 329

Must Know Euler's Method of Differential Equation For Calculus BC

Watch the matching video: <https://www.youtube.com/watch?v=Am2oi41UU9w>

Practice focus: Euler's method

Original extra practice matched to the listed lesson topic.

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

01 Use Euler's method for $y'=y$, $y(0)=1$, $h=0.1$, to estimate $y(0.1)$.

02 Continue one more step to estimate $y(0.2)$.

03 Use one $h=0.2$ step for $y'=x+y$, $y(0)=2$.

04 For $y'=y$ with $y(0)=1$, does forward Euler with positive steps underestimate the exact solution?

Worked answers | Lesson 329

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01 Use Euler's method for $y'=y$, $y(0)=1$, $h=0.1$, to estimate $y(0.1)$.

$$y_1 = y_0 + h f(0, y_0) = 1 + 0.1(1) = 1.1.$$

02 Continue one more step to estimate $y(0.2)$.

$$y_2 = 1.1 + 0.1(1.1) = 1.21.$$

03 Use one $h=0.2$ step for $y'=x+y$, $y(0)=2$.

$$y(0.2) \approx 2 + 0.2(0+2) = 2.4.$$

04 For $y'=y$ with $y(0)=1$, does forward Euler with positive steps underestimate the exact solution?

Yes. Exact e^x is convex; each tangent step lies below the exact curve, and the positive-rate iteration preserves the underestimate.