

Watch. Practice. Understand. | Lesson 294

Calculus Newton's Method for Finding Zeros, X-intercept or Roots of a Polynomial

Watch the matching video: <https://www.youtube.com/watch?v=4uGgZmfgxzc>

Practice focus: Newton's method

Original extra practice matched to the listed lesson topic.

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

01 Write Newton's iteration for solving $x^2-2=0$.

02 Starting with $x_0=1$, find x_1 and x_2 for that iteration.

03 Apply one Newton step to $x^3-8=0$ starting at $x_0=3$.

04 What prevents an ordinary Newton step if $f'(x_n)=0$?

Worked answers | Lesson 294

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Practice focus: Newton's method

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01 Write Newton's iteration for solving $x^2-2=0$.

$$x_{n+1}=x_n-(x_n^2-2)/(2x_n), \text{ requiring } x_n \neq 0.$$

02 Starting with $x_0=1$, find x_1 and x_2 for that iteration.

$$x_1=1.5; x_2=1.5-0.25/3=17/12 \approx 1.416667.$$

03 Apply one Newton step to $x^3-8=0$ starting at $x_0=3$.

$$x_1=3-(27-8)/27=62/27 \approx 2.296296.$$

04 What prevents an ordinary Newton step if $f'(x_n)=0$?

The formula divides by $f'(x_n)$; a zero derivative makes that step undefined.