

Watch. Practice. Understand. | Lesson 279

The Secret Technique of Using Linear Approximation. Calculus Section 3 10 Linear Appro...

Watch the matching video: <https://www.youtube.com/watch?v=TNxJMdzW3AQ>

Practice focus: Linear approximation

Original extra practice matched to the listed lesson topic.

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

01 Find the linearization of $f(x)=\sqrt{x}$ at $a=9$.

02 Use that linearization to estimate $\sqrt{9.12}$.

03 Use a linear approximation at 0 to estimate $e^{0.03}$.

04 Does the tangent approximation to $\sqrt{x}$ at 9 overestimate or underestimate nearby values?

Worked answers | Lesson 279

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Practice focus: Linear approximation

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01 Find the linearization of $f(x)=\sqrt{x}$ at $a=9$.

$f(9)=3$ and $f'(9)=1/6$, so $L(x)=3+(x-9)/6$.

02 Use that linearization to estimate $\sqrt{9.12}$.

$L(9.12)=3+0.12/6=3.02$.

03 Use a linear approximation at 0 to estimate $e^{0.03}$.

For e^x , $L(x)=1+x$ at 0. Estimate 1.03.

04 Does the tangent approximation to $\sqrt{x}$ at 9 overestimate or underestimate nearby values?

Overestimate: $f''(x)=-1/(4x^{3/2})<0$, so the concave-down graph lies below its tangent.