

Break-Ground:

Replacing curves with lines

Two young mathematicians discuss linear approximation.

Check out this dialogue between two calculus students (based on a true story):

Devyn: Hmmmm. Riley, I just thought of something. . .

Riley: What is it?

Devyn: When we compute derivatives, we are looking at the slope of tangent lines right?

Riley: You know it.

Devyn: Well, I wonder: Instead of studying curves, could we just study “zoomed-in” lines?

Riley: I’m not sure. . .

You read someplace that

$$\ell(x) = \frac{1}{4}(x - 4) + 2$$

is a good approximation for $f(x) = \sqrt{x}$ when x is close to 4.

Problem 1 Plot $\ell(x)$ and $f(x)$. Explain how this shows that $\ell(x)$ is a good approximation when x is close to 4.

Free Response:

Problem 2 Explain (if you can) using concepts of calculus to explain why $\ell(x)$ is a good approximation for $f(x)$ when x is close to 4.

Free Response:

Learning outcomes: