

Exercise walk-through

4.6

Approximating Values of a Function Using Local Linearity and Linearization

AP Calculus BC

You must be able to

- write the **linearization**
- use it to approximate a value

$$L(x) = f(a) + f'(a)(x - a)$$

1

The method

Method — Linearization

Near $x = a$,

$$f(x) \approx L(x) = f(a) + f'(a)(x - a)$$

– the tangent line at a .

Exercises 2.1-2.3

2.1 Write the linearization formula.

[1]

2.2 For $f(x) = \sqrt{x}$ at $a = 4$, state $f(4)$ and $f'(4)$.

[2]

2.3 State what $L(x)$ approximates.

[1]

Exercises 2.1-2.3

2.1 Write the linearization formula.

[1]

2.1

- $L(x) = f(a) + f'$

(a)

- $(x - a)f'$

2.2 For $f(x) = \sqrt{x}$ at $a = 4$, state $f(4)$ and $f'(4)$.

[2]

2.2

- $f(4) = 2; f'(4) = \frac{1}{4}$

2.3 State what $L(x)$ approximates.

[1]

2.3

- the value of $f(x)$ for x near a

Exercises 3.1-3.2

3.1 The linearization of f at a is

[1]

☐

A $f(a)$

B $f(a) + f'(a)(x - a)$

C $f'(a)(x - a)$

D $f(x) \cdot a$

3.2 Linearization uses the _____ line.

[1]

☐

A secant

B tangent

C normal

D horizontal

Exercises 3.1·3.2

3.1 The linearization of f at a is

[1]

☐

A $f(a)$

B $f(a) + f'(a)(x - a)$

C $f'(a)(x - a)$

D $f(x) \cdot a$

3.1 B

- $f(a) + f'(a)(x - a)$.

3.2 Linearization uses the _____ line.

[1]

☐

A secant

B tangent

C normal

D horizontal

3.2 B

- tangent.

Exercise 3.3 (a)

3.3 $f(x) = x^2$, $a = 3$, so $f(3) = 9$, $f'(3) = 6$.

(a) Write $L(x)$.

[1]

Exercise 3.3 (a)

3.3 $f(x) = x^2$, $a = 3$, so $f(3) = 9$, $f'(3) = 6$.

(a) Write $L(x)$.

[1]

(a)

- $L(x) = 9 + 6(x - 3)$

Exercise 3.3 (b)

3.3 $f(x) = x^2$, $a = 3$, so $f(3) = 9$, $f'(3) = 6$.

(b) Use it for $x = 3.1$.

[1]

Exercise 3.3 (b)

3.3 $f(x) = x^2$, $a = 3$, so $f(3) = 9$, $f'(3) = 6$.

(b) Use it for $x = 3.1$.

[1]

(b)

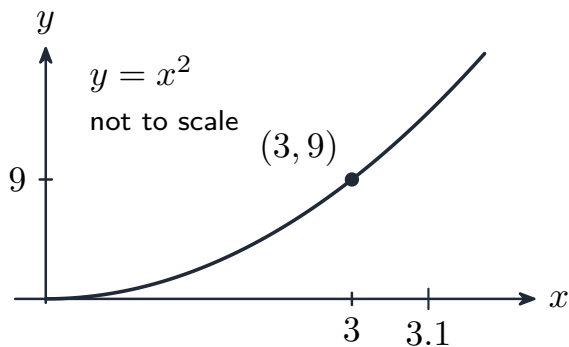
- $9 + 6(0.1)$

Exercise 3.3 (c)

3.3 $f(x) = x^2$, $a = 3$, so $f(3) = 9$, $f'(3) = 6$.

(c) State $L(3.1)$.

[1]

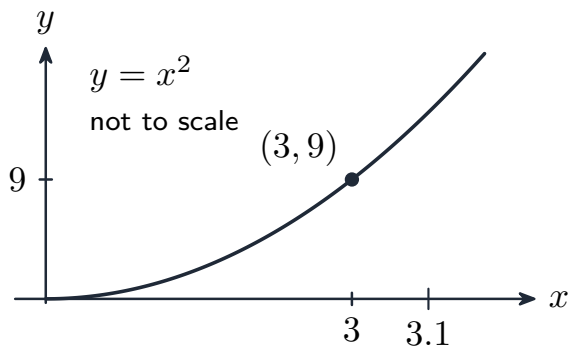


Exercise 3.3 (c)

3.3 $f(x) = x^2$, $a = 3$, so $f(3) = 9$, $f'(3) = 6$.

(c) State $L(3.1)$.

[1]



(c)

- 9.6