**Linear approximation of a function value at a given point.**

**Steps**

1. Find the derivative and substitute the given value to find .
2. Substitute the given value to the original equation to find .
3. Use the equation .

**Example 1**

Use the equation at to approximate .

Step 1) Find the derivative and substitute the given value to find .

Original equation

Write in exponential form.

Use the power rule

Rewrite in radical form.

Substitute value and solve

Find

Step 2) Substitute the given value to the original equation to find .

Original equation

Substitute value and solve

Find

Step 3) Use the equation where is the value of the original equation (2), is the value of the derivative (), is the value you want to approximate (3.9), and is the value you are using to approximate (4).

Comparing this with the decimal approximation the calculator gives, it is pretty close.

**Example 2**

Use the equation where to approximate .

Step 1) Find the derivative and substitute the given value to find .

Original equation

Take derivative

Substitute value and solve

Find

Step 2) Substitute the given value to the original equation to find .

Original equation

Substitute value and solve

Find

Step 3) Use the equation where is the value of the original equation (1), is the value of the derivative (2), is the value you want to approximate (0.8), and is the value you are using to approximate ().

Comparing this with the decimal approximation the calculator gives, it is pretty close.

**Now You Try**

1. Use the equation at to approximate.
2. Use the equation at to approximate .
3. Use the equation at to approximate .

Answers: 1) 2) 0.041616328 3) 0.141592653