October 14, 2026

National Dessert Day

Today in History:

Chuck Yeager breaks the sound barrier (1947)

Skydiver breaks sound barrier with 24-mile jump (2014)

Number of the Day: 692

692 = 2 x 2 x 173

692 is a number that has no digits in common with its cube**.**

Fun Fact:

Anatidaephobia is the fear that somewhere in the world, there is a duck watching you.

Quote of the Day:

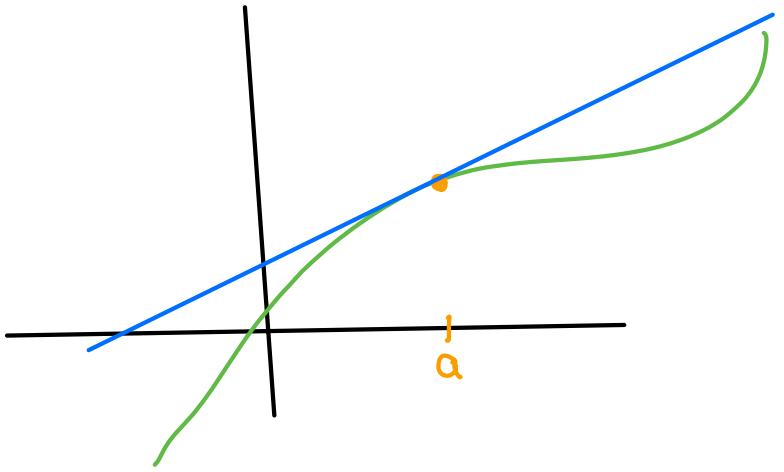
"Man cannot live by bread alone; he must have peanut butter."

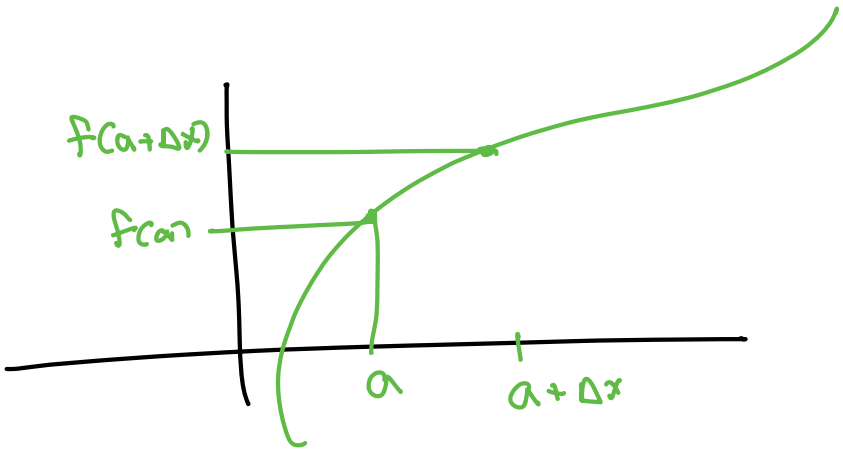
- James A. Garfield

Today's Weather:

Rain, high 72^{o}

LINEAR APPROX.





$$\Delta y = f(a+\Delta x) - f(a)$$

$$\lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x} = f'(a)$$

IF Δx IS SMALL

$$\Delta y \approx f'(a)\,\Delta x$$

EXAMPLE $f(x) = \frac{1}{x}$ $\quad a = 1$ $\quad \Delta x = .1$

$$\frac{1}{1.1} - \frac{1}{1} = f(1.1) - f(1) = \Delta y \approx f'(1)\,\Delta x$$

$f'(x) = -\frac{1}{x^2}$ $\quad f'(1) = -1$

$\Delta y \approx f'(1)\,\Delta x = (-1)(.1) = -.1$

$\frac{1}{1.1} - \frac{1}{1} = -.090909\ldots$

$f(x) = \sqrt{x}$ $\quad a = 16$ $\quad \Delta x = .1$

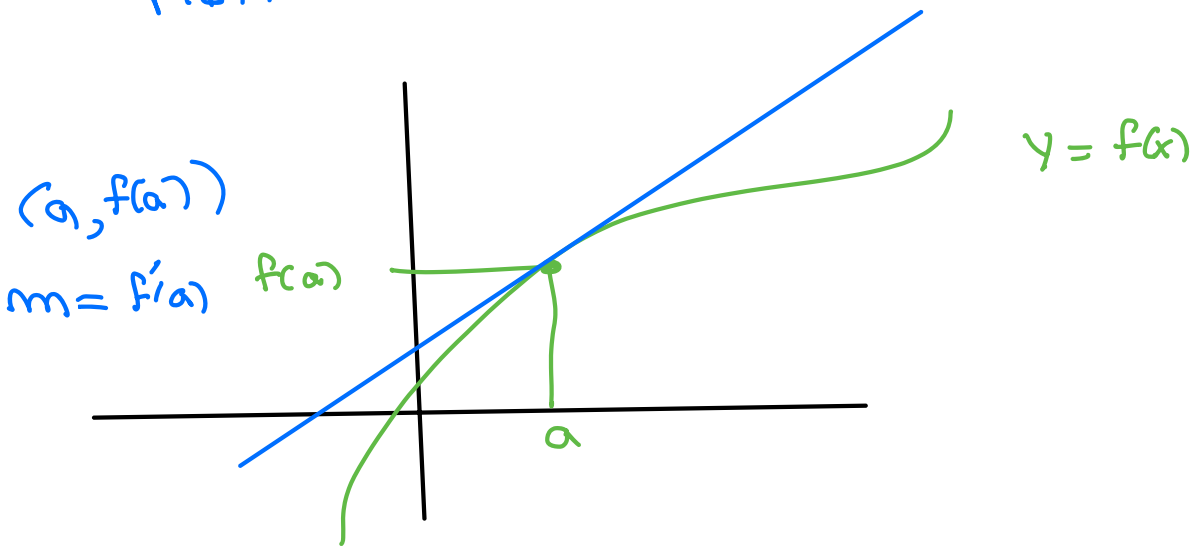
$\sqrt{16.1} - \sqrt{16} = f(16.1) - f(16)$

$= \Delta y \approx f'(16)\,\Delta x$

$f'(x) = \frac{1}{2\sqrt{x}}$ $\quad f'(16) = \frac{1}{2\sqrt{16}} = \frac{1}{8}$

$\Delta y \approx \frac{1}{8}(.1) = (.125)(.1) = .0125$

$\sqrt{16.1} - \sqrt{16} = .01248$



$y - f(a) = f'(a)(x - a)$

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

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

LOCAL LINEAR APPROX.

IF x IS "CLOSE" TO a

$$L(x) \approx f(x)$$

$f(x) = x^2$ $\qquad a = 4$

$f'(x) = 2x$ $\qquad f'(4) = 8$

$(4, 16)$

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

$$= 16 + 8(x-4)$$

$$(4.1)^2 = f(4.1) \approx L(4.1) = 16 + 8(4.1-4)$$

$$= 16 + 8(.1) = 16.8$$

$(4.1)^2 = 16.81$

$$(3.8)^2 = f(3.8) \approx L(3.8) = 16 + 8(3.8-4)$$

$$= 16 + 8(-.2)$$

$$= 16 - 1.6 = 14.4$$

$(3.8)^2 = 14.44$

$$(7)^2 = f(7) \approx L(7) = 16 + 8(7-4)$$

$$= 16 + 24 = 40$$

$7^2 = 49$

$f(x) = \ln x$ $\quad a = 1$

$f(1) = 0$ $\quad f'(x) = \frac{1}{x}$ $\quad f'(1) = 1$

$$L(x) = f(a) + f'(a)(x-a)$$
$$= 0 + 1(x-1)$$
$$= x - 1$$

$\ln(.5) = f(.5) \approx L(.5) = .5 - 1 = -.5$

$\rightarrow -.693$

$\ln(1.1) = f(1.1) \approx L(1.1) = 1.1 - 1 = .1$

$\rightarrow .0953$

$\ln(7) = f(7) \approx L(7) = 7 - 1 = 6$

$\rightarrow 1.9459$