AD21

How do you use linearization to approximate

Linearization is making a tangent & plugging in what value you are approximating.

AD22

Use linearization to approximate $e^{.05}$

Approximate $e^{.05}$

$f(x) = e^x \quad a = 0$

$\boxed{1}$ Point $e^0 = 1$

$f(0, 1)$

$\boxed{2}$ Slope

$f'(0) = \underline{1}$

$f'(x) = e^0 = 1$

$y - 1 = 1(x - 0)$

$y = 1(x - 0) + 1$

$y(x) = 1(x - 0) + 1$

$y(.05) = 1(.05) + 1$

$e^{.05} \approx 1.05$

AD23

The function f is twice differentiable with $f(2) = 1$, $f'(2) = 4$, and $f''(2) = 3$. What is the value of the approximation of $f(1.9)$ using the line tangent to the graph of f at $x = 2$?

The function f is twice differentiable with $\boxed{f(2) = 1}$, $\boxed{f'(2) = 4}$, and $f''(2) = 3$. What is the value of the approximation of $f(1.9)$ using the line tangent to the graph of f at $x = 2$?

Tangent Line: $x = 2$

$\boxed{1.}$ Point: $f(2) = \underline{1} \quad (2, 1)$

$\boxed{2.}$ Slope: $f'(2) = \underline{4} \quad m = 4$

$y - 1 = 4(x - 2)$

$y = 4(x - 2) + 1$

$y(1.9) = 4(1.9 - 2) + 1 = -.4 + 1 = \boxed{.6}$

AD24

What is absolute extrema? How do they compare to Relative? Endpoints can only be....?

Absolute Extrema:
Are the very largest & smallest y-values on a graph. Can happen at endpts OR critical #'s.

Relative Extrema:
Happen when f changes direction <u>or</u> f' changes sign

Endpoints: Only can be absolute extrema

Find the absolute & relative extrema for $f(x)=x^2-4x+5$ on the interval $[0,5]$

AD25

$f(x)=x^2-4x+5$ on $[0,5]$

$f'(x)=2x-4$

$0=2x-4$

$2x=4$

$x=2$

critical #

Find y-values for critical #'s <u>and</u> end points

x	y	
0	5	nothing - endpt. is absolute or nothing
2	1	Abs. min
5	10	Abs. max

$f(0)=0^2-4(0)+5=5$

$f(2)=4-8+5=1$

$f(5)=25-20+5=10$