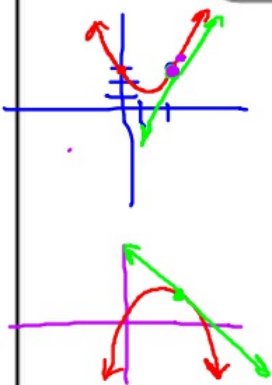


CALCULUS: Graphical, Numerical, Algebraic by Finney, Demana, Watts and Kennedy
Chapter 4: Applications of Derivatives
4.2/4.5: Linearization/Differentials/Mean Value Theorem pg. 196-204

What you'll Learn About
 Linearization is another term for tangent line
 Differentials are part of the derivative
 Mean Value Theorem



- a) Find the linearization of the function. b) Find $L(a + .1)$ and $f(a + .1)$
 c) Using concavity, determine if the Tangent Line at a is an overestimate or an underestimate. Justify your answer.

2. $f(x) = x^2 - 2x + 3$ $a = 2 = x$

a) $f'(x) = 2x - 2$ $(2, 3)$ c) $f''(x) = 2 > 0$
 $f'(2) = 2$
 $y = 3 + 2(x - 2)$
 $f(x)$ concave up
 Linearization underestimate

original \rightarrow b) $f(2.1) = (2.1)^2 - 2(2.1) + 3 = 3.21$
 tangent line \rightarrow $L(2.1) = 3 + 2(2.1 - 2) = 3.2$

1. $f(x) = \sqrt{1+x}$ $a = 0$

$a = -1$
 $f(x) = x + \frac{1}{x}$
 $f(x) = x + x^{-1}$

a) $f'(x) = 1 - x^{-2}$ b) $f(-.9) = -.9 + \frac{1}{-.9} = -2.011$
 $f'(-1) = 1 - \frac{1}{x^2}$
 $f'(-1) = 0$ $(-1, -2)$ $L(-.9) = -2$
 $y = -2 + 0(x + 1)$
 $y = -2$ c) $f''(x) = 2x^{-3} = \frac{2}{x^3}$
 $f''(-1) = \frac{2}{(-1)^3} < 0$

$f(x)$ concave down
 Linearization is overestimate

