4.5 Linearizations, Newton's Method and differentials

Newton's Method

locally linear - $y - f(x_1) = f'(x_1)(x - x_1)$

if you have an x-intercept then

solve for x

Oct 25-10:38 AM

Linearizations:

because of this - approximizations can be made for values of x close to a given point

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

Find a linearization of $f(x) = \sqrt{1 + x}$ at x = 0

Use the linearization to approximate $\sqrt{1.02}$

Oct 27-8:19 AM

Use linearizations to approximate $\sqrt{123}$

Oct 28-7:36 AM

Differentials

$$dy = f'(x)dx$$

the differential approximates Δy which is the actual change in y

Δx & Δy

Given $A = \pi r^2$ find the differential dA and evaluate dA for r = 10 and dr = .1

What does the differential dA represent?

Oct 28-7:37 AM

Percent change is represented by $\frac{df}{f(a)} \bullet 100$

If the radius of the earth is estimated to be $3959 \pm .1$ what effect would the tolerance of 0.1 have on an estimate of the earth's surface area?

Oct 17-9:52 AM