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Example

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Linearization, Newton's

Method, and Differentials 4\_5

*Page 6/96*

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~~Linearization Newton's~~

~~Method~~ 4-5 Newtons Method

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Linear Approximation *Linear*

*Approximation,*

*Differentials, Tangent Line,*

*Linearization,  $f(x)$ ,  $dy$ ,  $dx$*

- Calculus **4-9 Linearization**

*Page 7/96*

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Linearization And Newtons

Method Newton's

2nd Law of Motion (Knowledge

Box #4) *How to linearize the*

*nonlinear ODE for a simple*

*pendulum Newton's Method (1*

*of 2: How does it work?)*

Newton's Principia

Manuscript - Objectivity



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~~#100 Local Linearization  
Made Easy Trimming and  
Linearization, Part 1: What  
is Linearization? How to Do  
Implicit Differentiation  
(NancyPi)~~

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4.5 linearization and  
differentials

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~~Methodbook~~ Linear Approximation and

~~Differentials ( 151 3.10)~~

~~Finding the Linearization at~~

~~a Point / Tangent Line~~

~~Approximation AB — 5.5~~

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~~Method Example 3 5.5~~

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~~Calculus 4.5 Linearization~~

~~and Newton's Method Example~~

~~1 4.1 Linearization and~~

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~~Linear Approximations~~

**Linearization and Newton's  
method for solving nonlinear  
equations SanfordFlipMath AP  
Calculus 4.5A Linearization**

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4.5 Newtons method

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September 04, 2019 Sep 48:03

PM Approximating Binomial

Powers General linearization

or binomials  $(1+x)^k \approx 1+kx$

This is for very small

values of  $x$ . Ex. 3 Using the

formula above, find a linear

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Approximation for  $f(x)$  Try  
Using the formula above,  
find a linear

*4.5 Linearization and  
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## Linearization And Newtons

02, 2014 Linearization If  $f$  is differentiable at  $x=a$ , then the equation of the tangent line,  $L(x)=f(a)+f'(a)(x-a)$  Defines the linearization of  $f$  at  $a$ . The approximation  $f(x) \approx L(x)$  is the standard linear

# Access Free 4 5 Linearization And Newtons Approximation of $f$ at $a$ .

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02, 2014 Linearization If  $f$



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is differentiable at  $x=a$ ,  
then the equation of the  
tangent line,

$L(x) = f(a) + f'(a)(x-a)$  Defines  
the linearization of  $f$  at  $a$ .  
The approximation  $f(x) \approx L(x)$   
is the standard linear  
approximation of  $f$  at  $a$ . 4.5

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Method

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Sec 4.5 Linearization &  
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Linearization and Newtonç s

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Method Linearization If  $f$  is differentiable at  $x = a$ , then  $L(x) = f(a) + f'(a)(x - a)$  is the linearization of  $f$  at  $a$ .

Newton's Method 1. Guess an approximation to the solution of  $f(x) = 0$  2. Find successive approximations

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*Newton's Method - YouTube*

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1500 at University of

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4.5 LINEARIZATION AND

NEWTON'S METHOD The tangent

line to a curve can be used

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*Linearization and Newtons  
Method - AP Calculus 428 4.5*

...

4.5 Linearization and  
Newton's Method Objective  
SWBAT ?nd linear

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Approximation, use Newton's Method, estimating change with differentials, absolute relative, and percentage change, and sensitivity to change. Linear Approximation  
In our study of the derivative we frequently

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referred to the "tangent  
line to the curve" at a  
point.

*4.5 Linearization and  
Newton's Method Objective  
Linear ...*

4.5 Linearization & Newton's



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## Linearization And Newtons

Method Linear Approximation

Exploration Approximating

with Tangent Lines Let  $f(x)$

$= x^2$ . Use your graphing

calculator in this

exploration. 1. Show that

the line tangent to the

graph of  $f$  at the point

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## Linearization And Newtons

(1,1) is  $y = 2x - 1$ . 2. Set

$y_1 = x^2$  and  $y_2 = 2x - 1$ .

Zoom in on the two graphs at (1,1). What do you see?

*Sec 4.5 Linearization &  
Newton's Method*

4.5 Notes.notebook 1

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November 04, 2014 Oct 27 8:13

PM 4.5 Linearization and

Newton's MethodName: \_\_\_\_\_

Objectives: Students will be able to find linearizations and use

*4.5 Linearization and*

*Page 27/96*

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*Newton's Method*

4.5 Linearization and  
Newton's Method

Linearization If  $f$  is  
differentiable at  $x=a$ , then  
 $L(x) = f(a) + f'(a)(x-a)$  is the  
linearization of  $f$  at  $a$ .

Newton's Method 1. Guess an

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Approximation to the  
solution of  $f(x) = 0$ .

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This method for approximating roots of equations is called Newton's method (or the Newton-Raphson method). Newton's

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Method Again, as we see in the picture, the x-intercept of this line IS "closer" to the desired root than our second approximation By setting  $y = 0$  and solving for  $x$ , we get

0.4	0.2	1	-0.2
-0.4	193	132	49
(	11	193	



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*Linearization and Newton's  
Method*

Period 8 Nicolas Barroga  
Arthur Sandro

*Section 4.5 Linearization  
and Newton's Method -*

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4.5 LINEARIZATION AND  
NEWTON'S METHOD

Linearization The goal of  
linearization is to  
approximate a curve with a

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line. Why? Because it's easier to use a line than a curve! The basic idea of linearization is to find the equation of the tangent line at a certain point, and use the tangent line to estimate the desired value of the

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Methodbook  
original function. Example:

Consider  $f(x) = x^2$ . We all know that  $f(4) = 16$ , but without a calculator, what is  $f(4.1)$  ?

*Example*  $f(x) = x^2$  *Example*  $y = x^2$

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## Linearization And Newtons

### 4.5 Linearization and Newton's Method

Linearization If  $f$  is differentiable at  $x=a$ , then  $L(x) = f(a) + f'(a)(x-a)$  is the linearization of  $f$  at  $a$ .

Newton's Method 1. Guess an approximation to the

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Linearization The goal of  
linearization is to



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Approximate a curve with a line. Why? Because it's easier to use a line than a curve! The basic idea of linearization is to find the equation of the tangent line at a certain point, and use the tangent line to estimate

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the desired value of the original function. Example: Consider  $f(x) = x^2$ . We all know that  $f(4) = 16$ , but without a calculator, what is  $f(4.1)$  ?

*Example*  $f(x) = x^2$

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*Example*  $y = +x$

Chapter 4: Applications of  
Derivatives Section 4.5:

Linearization and Newton's  
Method (page 233) Notes •

Linearization: If  $f$  is  
differentiable at  $x=a$ , then  
the equation of the tangent

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line  $L(x) = f(a) + f'(a)(x - a)$  defines the linearization of  $f$  at  $a$ . The approximation  $f(x) \approx L(x)$  is the standard linear approximation of  $f$  at  $a$ .

*Chapter 4: Applications of*

*Page 44/96*

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*Methodbook Section 4.5 ...*

So the equation of the tangent line at  $x$  is equal to 4, and then we use that linearization, that linearization defined to approximate values local to it, and this technique is

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called local linearization.

So what I'm saying is, let's figure out what this, the equation of this line is.

Let's call that  $l$  of  $x$ .

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the Authors Vladislav A.  
Yastrebov is a postdoctoral-  
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Mechanics at MINES ParisTech  
in France. His work  
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sciences regarding  
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their comprehension of  
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Gram-Schmidt process.

Programming Mathematics

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