

## Resources on Derivatives

### Paul's Online Notes:

You can find his lessons on derivatives here:

<http://tutorial.math.lamar.edu/Classes/Calcl/DerivativeIntro.aspx>

Alignment with textbook sections:

Paul's page	Our section
The Definition of the Derivative	2.7: Derivatives and Rates of Change 2.8: The Derivative as a Function
Interpretation of the Derivative	2.7: Derivatives and Rates of Change
Differentiation Formulas	3.1: Derivatives of Polynomial and Exponential Functions
Product and Quotient Rule	3.2: The Product and Quotient Rules
Derivatives of Trig Functions	3.3: Derivatives of Trigonometric Functions
Derivatives of Exponential and Logarithm Functions	3.1: Derivatives of Polynomial and Exponential Functions 3.4: The Chain Rule
Derivatives of Inverse Trig Functions	3.5: Implicit Differentiation
Chain Rule	3.4: The Chain Rule
Implicit Differentiation	3.5: Implicit Differentiation
Related Rates	3.9: Related Rates

### Khan Academy:

You can find their videos on limits here: <https://www.khanacademy.org/math/differential-calculus/taking-derivatives>

\* = a tutorial exercise

#### 2.7: Derivatives and Rates of Change

Slope of a line secant to a curve

Slope of a secant line examples 1-3

Approximating instantaneous rate of change word problem

Approximating equation of tangent line word problem

Derivative as slope of tangent line

Tangent slope as limiting value of secant slope examples 1-3

\*Tangent slope is limiting value of secant slope

#### 2.8: The Derivative as a Function

Calculating slope of tangent line using derivative definition

The derivative of  $f(x)=x^2$  for any  $x$

Formal and alternate form of the derivative

Formal and alternate form of the derivative example 1

\*The formal and alternate form of the derivative

### 3.1: Derivatives of Polynomial and Exponential Functions

Power rule

Is the power rule reasonable

Derivative properties and polynomial derivatives

\*Power rule (basic)

\*Power rule (advanced)

### 3.2: The Product and Quotient Rules

The product rule for derivatives

\*Product rule

Quotient rule from product rule

Quotient rule for derivative of  $\tan x$

\*Quotient rule

### 3.4: The Chain Rule

Chain rule introduction

Chain rule definition and example

Chain rule for derivative of  $2^x$

Chain rule example using visual function definitions

Chain rule example using visual information

\*Chain rule on two functions

Chain rule with triple composition

\*Chain rule on three functions

### 3.5: Implicit Differentiation

Implicit differentiation

Showing explicit and implicit differentiation give same result

Implicit derivative of  $(x-y)^2 = x+y-1$

Implicit derivative of  $y = \cos(5x-3y)$

Implicit derivative of  $(x^2+y^2)^3 = 5x^2y^2$

Finding slope of tangent line with implicit differentiation

Implicit derivative of  $e^{(xy^2)} = x-y$

\* Implicit differentiation

### 3.6: Derivatives of Logarithmic Functions

Derivative of log with arbitrary base

### 3.9: Related Rates

under [https://www.khanacademy.org/math/differential-calculus/derivative\\_applications](https://www.khanacademy.org/math/differential-calculus/derivative_applications)

Rates of change between radius and area of circle

Rate of change balloon height

Related rates water pouring into cone

Falling ladder related rates

Rate of change of distance between approaching cars

Speed of shadow of diving bird

\*Related rates