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# Calculus Videos

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## Part I

# Derivatives

## Derivatives

### *Introduction*

On the next pages, you will watch videos about derivatives and will then answer some questions about the video.

The key ideas of these videos are:

- The goal of this video is to understand how a GPS unit can find the speed of a car 10 seconds after it leaves an intersection.
- You can approximate the speed at 10 seconds by finding an average speed over an interval immediately before or after the 10-second mark.
- Average speed is found by dividing change in distance by change in time
- For fixed amounts of change in time  $t$ , the changes in the cars distance will be increasing. Consequently, using the interval before the 10-second mark produces an underestimate of the cars speed.

# Derivatives

*Video: Intro to Approximating Speed*

YouTube link: <https://www.youtube.com/watch?v=pJko-zIvXPI>

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Learning outcomes:

# Derivatives

*Video: Better Approximations to Speed*

YouTube link: [https://www.youtube.com/watch?v=cj\\_ATjLbLOI](https://www.youtube.com/watch?v=cj_ATjLbLOI)

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Learning outcomes:

# Derivatives

## *Questions*

Google Form link: <https://docs.google.com/forms/d/e/1FAIpQLSfa8U6U4gI1Q1WHaFWZ2cbfZLMLVL4dsy6J>

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Learning outcomes:

# Derivatives

*Stop*

This is the end of the derivatives section.

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Learning outcomes:



## Part II

# Graphing Derivative Functions

## Graphing Derivative Functions

### *Introduction*

On the next page, you will watch a video on graphing derivative functions and will then answer some questions about the video.

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Learning outcomes:

## Graphing Derivative Functions

*Video*

YouTube link: <https://www.youtube.com/watch?v=Zae2lpj2JNM>

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Learning outcomes:

## Graphing Derivative Functions

*Questions*

Google Form link: [https://docs.google.com/forms/d/e/1FAIpQLSfqC6\\_EYBLph2CYZ100wee1o7tky2c01Jan](https://docs.google.com/forms/d/e/1FAIpQLSfqC6_EYBLph2CYZ100wee1o7tky2c01Jan)

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Learning outcomes:

## Graphing Derivative Functions

*Stop*

This is the end of the graphing derivative functions section.

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Learning outcomes:

## Part III

# Using Basic Derivative Rules

## Using Basic Derivative Rules

### *Introduction*

On the next pages, you will watch videos about using basic derivative rules and will then answer some questions about the video.

Here are four questions that you should be able to answer after watching the video:

- (a) Why is the derivative of a constant function zero?
- (b) How do you find the derivative of a polynomial?
- (c) How do you find the derivative of an exponential function?
- (d) How do you find the derivative of a logarithmic function?

## Using Basic Derivative Rules

*Video: The Power Rule*

YouTube link: <https://www.youtube.com/watch?v=007aEaYcEpA>

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Learning outcomes:

## Using Basic Derivative Rules

*Video: Derivatives of Exponentials and Logs*

YouTube link: <https://www.youtube.com/watch?v=Raw6bJyLvks>

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Learning outcomes:

## Using Basic Derivative Rules

### *Questions*

Google Form link: [https://docs.google.com/forms/d/e/1FAIpQLSdWnAJ\\_3zVZ0f2Kq6mvodlnDac8\\_bNR34Qd1TjQaQLC0Y1LeQ](https://docs.google.com/forms/d/e/1FAIpQLSdWnAJ_3zVZ0f2Kq6mvodlnDac8_bNR34Qd1TjQaQLC0Y1LeQ)

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Learning outcomes:



## Using Basic Derivative Rules

*Stop*

This is the end of the basic derivative rules section.

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Learning outcomes:

## Part IV

# The Chain Rule

## The Chain Rule

### *Introduction*

On the next pages, you will watch two videos about the chain rule and will then answer some questions about the video.

- The goals of these videos are to explain when you would need to use the chain rule and how to use the chain rule to find derivatives
- You use the chain rule when you have two composed functions - one function “inside” another, like  $f(g(x))$
- To find the derivative, you do  $f'(g(x)) * g'(x)$
- The reason for doing this is because the derivative of  $f$  doesn't just depend on  $x$ , but rather on the value of  $g(x)$ . So when  $g(x)$  changes quickly, it affects how quickly  $f(g(x))$  changes

# The Chain Rule

*Video: Introduction*

YouTube link: <https://www.youtube.com/watch?v=GH1KQGhWSSA>

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Learning outcomes:

# The Chain Rule

*Video: Procedure*

YouTube link: <https://www.youtube.com/watch?v=jotT0iJLfn0>

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Learning outcomes:

# The Chain Rule

## *Questions*

Google Form link: [https://docs.google.com/forms/d/e/1FAIpQLSdV\\_TKpsDHq1jRzJq-0Nm5gne6q4Xwh33UR](https://docs.google.com/forms/d/e/1FAIpQLSdV_TKpsDHq1jRzJq-0Nm5gne6q4Xwh33UR)  
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Learning outcomes:

## The Chain Rule

*Stop*

This is the end of the chain rule section.

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Learning outcomes:

## Part V

# Optimization

## Optimization

### *Introduction*

On the next page, you will watch two videos on optimization and will then answer some questions about the video.

# Optimization

*Video*

YouTube link: <https://www.youtube.com/watch?v=neUU8B2W984>

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Learning outcomes:



# Optimization

*Video*

YouTube link: <https://www.youtube.com/watch?v=E2FvgfIr4kQ>

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Learning outcomes:

# Optimization

## *Questions*

Google Form link: [https://docs.google.com/forms/d/e/1FAIpQLScU80e2G35lrgDnP\\_agBarJGeAkyapBzijVGHMkONcr3TOKzQ](https://docs.google.com/forms/d/e/1FAIpQLScU80e2G35lrgDnP_agBarJGeAkyapBzijVGHMkONcr3TOKzQ)

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Learning outcomes:

# Optimization

*Stop*

This is the end of the optimization section.

## Part VI

# Integrals from Riemann Sums

## Integrals from Riemann Sums

### *Introduction*

On the next page, you will watch two videos about constructing integrals from Riemann sums and will then answer some questions about the video.

## Integrals from Riemann Sums

*Video*

YouTube link: <https://www.youtube.com/watch?v=-VPLnHJ8-Yo>

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Learning outcomes:

## Integrals from Riemann Sums

*Video*

YouTube link: <https://www.youtube.com/watch?v=80qgskFG-dA>

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Learning outcomes:

## Integrals from Riemann Sums

*Questions*

Google Form link: [https://docs.google.com/forms/d/e/1FAIpQLSfWlPgiQPxBMQ8afmf-E4Xl\\_95RKyWYpiM37Vid-Y\\_D20HZQ](https://docs.google.com/forms/d/e/1FAIpQLSfWlPgiQPxBMQ8afmf-E4Xl_95RKyWYpiM37Vid-Y_D20HZQ)

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Learning outcomes:

## **Integrals from Riemann Sums**

*Stop*

This is the end of the integrals from Riemann sums section.



## Part VII

# Anti-derivatives

## Antiderivatives

### *Introduction*

On the next page, you will watch a video about antiderivatives and will then answer some questions about the video.

Video 7 outline to be written

# Antiderivatives

*Video*

Video 7 will appear here

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Learning outcomes:

# Antiderivatives

## *Questions*

Google Form link: <https://docs.google.com/forms/d/e/1FAIpQLSdZrONo1V9WhFC0fDvGT-kkFPGbRdEGCp27Qg>

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Learning outcomes:

# Antiderivatives

*Stop*

This is the end of the antiderivatives section.

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Learning outcomes: