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1. Motivation

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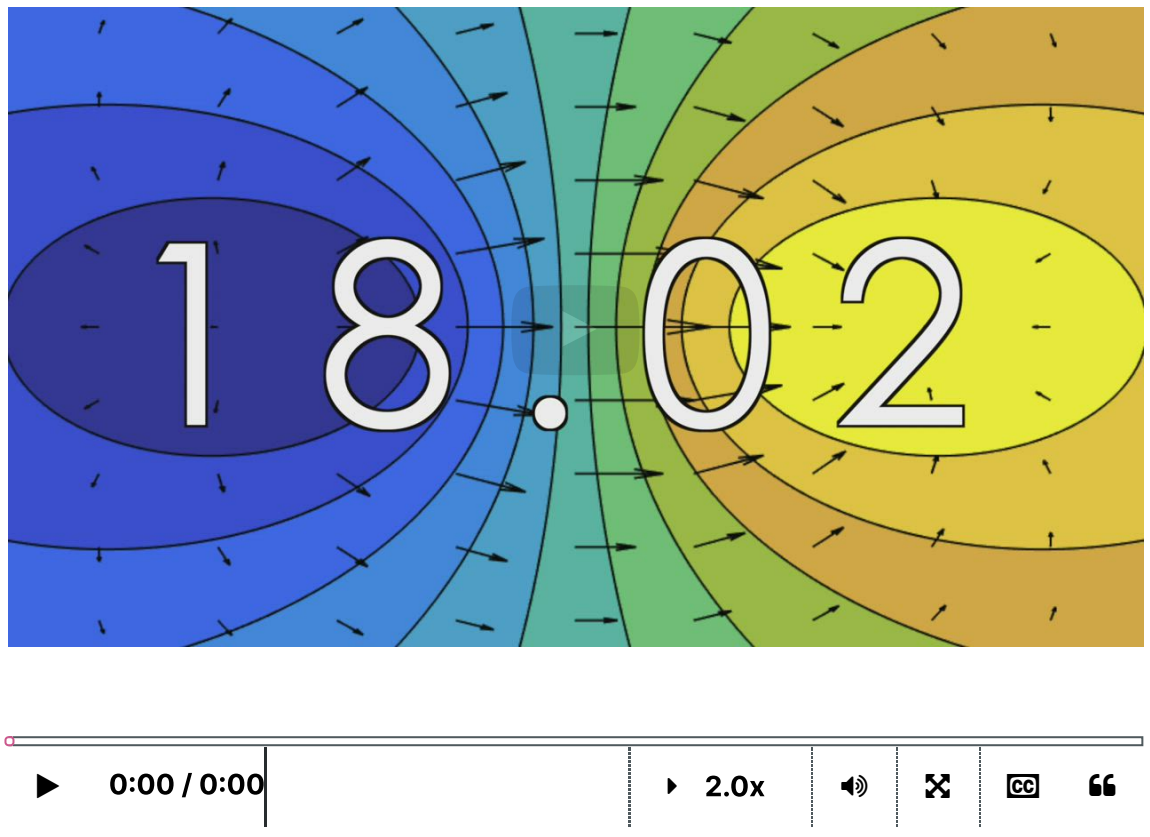
Introduction to multivariable calculus



Start of transcript. Skip to the end.

Welcome to 18.02.

18.02 I think is a really interesting class.

And the subject of the class, the thing that's

different from 18.01, is that it's

about functions that depend on several variables.

And I want to give you a few examples

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In single variable calculus, you studied functions that depend on one variable $f(x)$. The theme of this class is functions that depend on more than one variable.

The physical world is three-dimensional, so functions of more than one variable appear any time we try to describe our world. For example:

1. **Studying weather:** Temperature and air pressure are different at different places depending on longitude, latitude, and altitude. In other words, these values depend on x, y, and z.

2. **Engine design:** Designing an engine depends on many parameters, including sizes of components and the dimensions of combustion chambers. We want to choose these parameters to optimize the efficiency of the engine. Therefore, the efficiency is a function that depends on a lot of variables, probably more than three!

3. **Robot motion:** Let's say we want to program the motion of a robot arm (an example we'll explore in this course) which has 100 joints, each one controlled by an individual motor. We can control the angle of each joint, and we'll call these angles $\theta_1, \theta_2, \ldots, \theta_{100}$. In order to program the robot, we need to manipulate a function of 100 variables!

4. **Data science and machine learning:** Many problems in data science depend on thousands (even millions) of parameters! For example, the technology behind self-driving cars requires sensory input from technology such as video cameras and radar sensors. Machine learning algorithms that control processes like automatic braking use the data gathered by sensory systems to help these cars adapt to their surroundings.

   Note on video: The human genome is estimated to have about 30,000 genes, not billions.

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We'd love to hear from you about why you are taking this course! What multivariable

We'd love to hear from you about why you are taking this course! What multivariable contexts are you interested in? Open the discussion prompt below and provide or comment on other examples from your life that involve functions of many variables.

1. Motivation

Topic: Unit 1: Functions of two variables / 1. Motivation

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Motivation It is said that philosophers must understand math. I don't really know how math is related to philosophy, but I thought why not ju...	2
Why I take this course I want to study multivariable calculus because I try to pursue graduate study in data science and machine learning. Thanks a lot f...	3
mi motivacion quiero ser un gran ingeniero para mi pais	1
For Physics I think it will give me a base to understand the physics better	1
Why I am taking this course I am taking this course to polish my knowledge in multivariable calculus.	1
Motivation I like the subject and I would also like to master it to better understand topics such as thermodynamics, Data science and machi...	2
Optics and waves Very interested in understanding deeply optical fields and waves	4
My Motivation I teach single-variable calculus at the high school level, and I am taking this course to give me context for what my students nee...	2
fluid dynamics As somebody involved in fluid dynamic simulations, i thought it would be great to brush up my multi variable problem solving cap...	2
Optimizers for Machine Learning/Deep Learning One of the multivariable contexts I am interested in are optimizers used in ML/DL models. I want to get a better insight into what ...	2
Why I'm taking this course Multivariable calculus is the first leap into the intensely applied world of mathematics and being able to solve real-world complex...	1
Why I am taking this course? I want to transition from geology to material science engineering and math has always fascinated me.	1
Why I am taking this course I am a physics student in Mexico. I already had a course of vector calculus but I feel that I have forget many details of the course	1

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