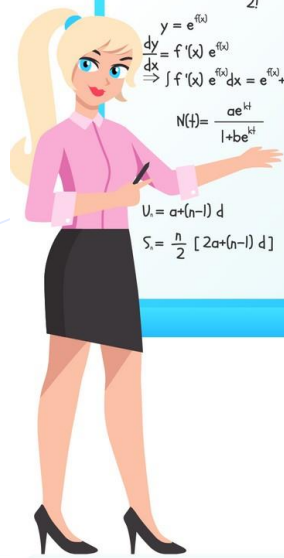


My Maths Cloud

Calculus

Textbook and Course Advice



$(1+x)^n = 1 + nx + \frac{n(n-1)}{2!}x^2 + \dots$	<p>Area = $\int_a^b f(x) dx$</p>
$y = e^{kx}$ $\frac{dy}{dx} = f'(x) e^{kx}$ $\Rightarrow \int f'(x) e^{kx} dx = e^{kx} + c$	$\sin 2x = \sin(x+x)$ $= \sin x \cos x + \cos x \sin x$ $= 2 \sin x \cos x$
$N(t) = \frac{ae^{kt}}{1+be^{kt}}$	$\sum_{i=1}^n i = \frac{n(n+1)}{2}$
$U_n = a + (n-1)d$	$\frac{dy}{dx} = \frac{dy}{dt} \times \frac{dt}{dx}$
$S_n = \frac{n}{2} [2a + (n-1)d]$	$\sigma_x = \sqrt{\frac{\sum x^2}{n} - \bar{x}^2}$
	$\bar{x} = \frac{\sum f \cdot x}{n}$

Calculus

Table of Contents

1	Textbooks	2
1.1	Intuition	2
1.2	Best.....	2
1.3	Calculus of Analysis for Functions of Several Variables	2
1.4	Vector Calculus	3
2	Videos.....	4
3	Websites.....	5
4	Calculus I, II and III Syllabi (non-math degree courses).....	6
4.1	Calculus I	6
4.2	Calculus II	6
4.3	Calculus III	6



1 Textbooks

1.1 Intuition

- The Cartoon Guide to Calculus, Larry Gonick
- The Manga Guide To Calculus, Kojima
- Elements of Calculus, Granville

1.2 Best

- Calculus, Stewart 8th Edition
- Thomas' Calculus 14th edition
- Calculus, Ron Larson
- Calculus A Complete Course, Robert Adams
- The Calculus Lifesaver, Adrian Banner
- Schaum's Calculus
- Schaum's Calculus 3000 solved problems
- Schaum's Advanced Calculus 1370 problems
- Calculus Made Easy, Silvanus P. Thompson and Martin Gardner
- A Course of Pure Mathematics, G.H. Hardy
- Calculus, Gilbert Strang
- Calculus OpenStax, Gilbert Strang (Volume 1,2,3)
- Intro to Calculus and Analysis, Richard Courant

1.3 Calculus of Analysis for Functions of Several Variables

The following books are best for someone interested in pure mathematics who wants to have a deep understanding of calculus. So, if you are in a proof-based program or are just interested in the formality of calculus, Spivak's calculus is a good place to start.

In my order:

- (1) Stewart Calculus
This doesn't provide enough rigor, but is a good starting point for very early beginners into calculus.
- (2) Elementary Analysis: The Theory of Calculus, Kenneth A. Ross
You can find exercise solutions for this online.
- (3) Spivak calculus
This is a great book for more understanding
- (4) Abbott Understanding Analysis
This is a pretty small text
- (5) Calculus Vol 1, Apostol
- (6) Calculus Vol 2, Apostol

1.4 Vector Calculus

- Vector Calculus, Marsden & Tromba
- Openstax (Volume 3), Strang
- Schaums Vector Analysis
- Vector Calculus, Corral
- Vector Calculus, Hubbard

2 Videos

- Khan Academy
<https://www.khanacademy.org/>
- Professor Leonard playlists
Calculus 1:
<https://www.youtube.com/watch?v=fYvARMqiaag&list=PLF797E961509B4EB5>
Calculus 2:
https://www.youtube.com/watch?v=H9eCT6f_Ftw&list=PLDesaqWTN6EQ2J4vgsN1HyB_eRADEh4Cw-
Calculus 3:
<https://www.youtube.com/watch?v=tGVnBAHLApA&list=PLDesaqWTN6ESk16YRmzuJ8f6-rnuy0Ry7>
- 3Blue1Brown Essence of Calculus series
This is great for intuition and to understand the meaning behind concepts
<https://www.youtube.com/playlist?list=PLZH0ObOWTQDMsr9K-rj53DwVRMYO3t5Yr>
- Blackpenredpen
<https://www.youtube.com/c/blackpenredpen/playlists>
- Patrick JMT
<https://www.youtube.com/user/patrickJMT>
- Professor Butler
https://www.youtube.com/channel/UC2VuCzJx_9luS0y-WDfL3Tg
- Jeff Suzuki
<https://www.youtube.com/user/jeffsuzuki1>
- Eddie Woo
<https://www.youtube.com/user/misterwootube>
- Rootmath.org
<https://www.youtube.com/user/rootmath>
- Trefor Bazett playlists
These playlists cover conceptual ideas and example problems and are great for single variable calc)
 - **Calculus I**
https://www.youtube.com/watch?v=LWPzHISBlxI&list=PLHXZ9OOGMqxfT9R_McReZ4WcoVILP4k6-m
 - **Calculus II**
<https://www.youtube.com/watch?v=i4c8n4S-Sp0&list=PLHXZ9OOGMqxc4vSKTIW19TLrT91Ik9M4n>
 - **Calculus III**
https://www.youtube.com/watch?v=gsUgDpGWk-M&list=PLHXZ9OOGMqxc_CvEy7xBKROr6I214QJcd
 - **Calculus IV**
<https://www.youtube.com/watch?v=AixiYG-gZ00&list=PLHXZ9OOGMqxfW0GMqeUE1bLKAYor6kbHa>
 - **Multivariable**
https://www.youtube.com/watch?v=gsUgDpGWk-M&list=PLHXZ9OOGMqxc_CvEy7xBKROr6I214QJcd

3 Websites

- Pauls Online Maths Notes:
https://tutorial.math.lamar.edu/?fbclid=IwAR2GAIYCQmq6JnC7XSzsq9OyAdmOyvvdVaSAQMKLjMUss3fhCrdKwPcy_bx8
- MIT:
<https://ocw.mit.edu/index.htm>

https://ocw.mit.edu/courses/mathematics/18-01sc-single-variable-calculus-fall-2010/?fbclid=IwAR0iKIZOUdIccwvIEr8OfmSYqNzwtNbL9XT9ouHPE0_0a9cef0wfgr4vtKQ
- Pre Calc in 5 hours
<https://youtu.be/eI4an8aSsgw>
- Calc in 12 hours
https://youtu.be/HfACrKJ_Y2w
- Outlier
This is paid but worth it
<https://www.outlier.org/products/calculus-i>

4 Calculus I, II and III Syllabi (non-math degree courses)

4.1 Calculus I

This is like Calculus AB at school

- i. Review of functions, trig, logs and exponentials
- ii. Limits and continuity
- iii. Differentiation and applications of differentiation
 - 1st principles
 - All diff types
 - Related rates
 - Max & min value
 - Mean value theorem
 - Optimisation
 - Linear approximation
- iv. Integration and applications of integration
 - Basic integration (indefinite and definite and finding areas)
 - Fundamental theorem of calculus
 - All basic types
 - Integration by substitution
 - Average function value
 - Volume of solids by revolution
 - Volume defined by cross sections
- v. Particle motion – 1 direction

4.2 Calculus II

This is like Calculus BC at school

- i. Partial Fractions
- ii. Integration
 - Integration by parts
 - Inverse trig integrals (know how to integrate all fractions)
 - Trig integrals and trig substitutions
 - Improper Integrals
 - Arc length
- iii. Parametric Equations
- iv. Polar coordinates
- v. Sequences and series (convergence and divergence)
- vi. Particle motion – 2 directions
- vii. Vector basics and calculus

4.3 Calculus III

This extends the basics of calculus to n dimensions-multivariable calculus

- i. Partial differentiation
- ii. Applications of partial differentiation
 - Tangent planes and linear approximations
 - Gradient vector, normal lines, directional derivative
 - Relative min's and max's
 - Lagrange multipliers
- iii. Cylindrical and spherical coordinates
- iv. Double and triple integrals
- v. Line integrals
 - Vector fields

- Fundamental theorem for line integrals
 - Green's Theorem
- vi. Surface integrals
- Curl and divergence
 - Parametric surfaces
 - Stoke's Theorem
 - Divergence Theorem