



## CLASSES

This is a small single section course taught in one section.

Classes meet on Monday, Wednesday and Fridays at 10:30 AM in SC 309.

Zoom

First class: January 27, 2020

## MQC

Zoom

Sun/Tue/Thu in 105, 8:30-10:30PM

## EXAM DATES

1.EXAM	2.EXAM	FINAL
MAR 4	APR 8	MAY
CLASS	CLASS	TBA

## GRADES

PART	PERCENTAGE
1. HOURLY	15
2. HOURLY	15
HOMEWORK	30
FINAL	40

Harvard University Spring 2020

# MATH 1A

## SYLLABUS 2020

While the ideas of calculus already trace back to the time of ancient Greece, the subject exploded into a powerful tool during the last few centuries. It is now an important theoretical foundation for other mathematical areas and scientific fields. It is no exaggeration to say that the art of calculus is one of most amazing scientific and cultural achievements of humanity.

At the core we have differential and integral calculus. Differential calculus studies "change", integral calculus deals with "accumulation". The fundamental theorem of calculus links the two. The subject is very applicable to problems from other scientific disciplines. Calculus is not only important because of its content and applications like life sciences (example: tomography), data science (example: compute correlations), internet (example: networks), artificial intelligence (example: machine learning), geography (example: data visualization), movie and game industry (computer graphics), the ideas of calculus also enter in disguised form, in statistics, economics, computer science, in art or music theory.

While an important point is that calculus can appear in different forms, we primarily also want to learn the nuts and bolts and down to earth techniques.

## TEXTBOOK

Class notes, homework and exercises are distributed in class and posted.

## ORGANISATION

Course head: Oliver Knill ("Oliver")

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## CA'S

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# CALENDAR

S	M	T	W	T	F	S
26	27	28	29	30	31	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
1	2	3	4	5	6	7
8	9	10	11	12	13	14
14	15	16	17	18	19	20
22	23	24	25	26	27	28
29	30	31	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	1	3
4	5	6	7	8	9	10

# SYLLABUS

- 1 What is Calculus?
- 2 Functions
- 3 Limits
- 4 Continuity
- 5 Intermediate Value theorem
- 6 Fundamental Theorem
7. Rate of Change
- 8 Derivative
- 9 Product and quotient rule
- 10 Chain rule
- 11 Critical points and extrema
- 12 Optimization problems
- 13 Hospital rule
14. Newton Method
- 15 Review
- 16 First midterm
- 17 Catastrophe theory
- 18 Integrals
- 19 Fundamental Theorem
- 20 Anti derivatives

- 21 Areas
- 22 Volumes
- 23 Improper integrals
- 24 Implicit differentiation
- 25 Substitution
- 26 Integration by parts
- 27 Review
- 28 Second midterm
- 29 Numerical Integration
- 30 Partial fractions
- 31 Trig substitution
- 32 Statistics
- 33 Economics
- 34 Computing
- 35 Music
- 36 Data
- 37 Review

Reading period and Exam period

Remote teaching

SPRING BREAK and MOVE OUT