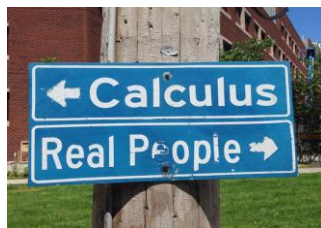


Goals



Check out more [info](#).

By the end of this unit, students:

- understand the concepts and techniques in applications of calculus and statistical inference
- apply reasoning skills and solve problems in applications of calculus and statistical inference
- communicate their arguments and strategies when solving problems
- construct proofs of results
- interpret mathematical and statistical information and ascertain the reasonableness of their solutions to problems.

This week:

- establish and use the formula $\int \frac{1}{x} dx = \ln |x| + c$, for $x \neq 0$
- find and use the inverse trigonometric functions: arcsine, arccosine and arctangent
- find and use the derivative of the inverse trigonometric functions: arcsine, arccosine and arctangent
- integrate expressions of the form $\frac{\pm 1}{\sqrt{a^2 - x^2}}$ and $\frac{a}{a^2 + x^2}$

Theoretical Components

Read the notes and study the examples.

Integration using substitution (mathspace):

- <https://goo.gl/gD2xSj> (u-substitution)
- <https://goo.gl/PLiW64> (trig substitution)

Video Examples:

- <https://goo.gl/F5eoMU>
- <https://goo.gl/yZtG5w>
-

For fun lovers:

Gauss's magic shoelace area formula and its calculus companion:

<https://goo.gl/l6QOys>

Practical Components

Exercises: available in Google Classroom/ABOUT/Resources/S2/WK02

Set 1: Integrals involving logs – attempt all even numbered questions.

Set 2: Inverse Trig Functions – attempt odd numbered questions.

Investigation

Let $y(t)$ denote the number of cells infected by covid-19 virus t minutes after the experimental laboratory animal was injected with the virus. Assume that $y(t)$ is modelled by the initial-value problem

$$\frac{dy}{dt} = (\ln 2) \cdot 2^{\frac{t}{20}}, \quad y(0) = 20$$

Use this model to estimate the number of infected cells 2 hours after the start of the experiment.

20 marks

Q/F/O
Quiz/Forum/Other

Read about Sofya Vasilyevna Kovalevskaya – the Russian mathematician who made valuable contribution to the theory of partial differential equations:

<https://goo.gl/CTHhus>