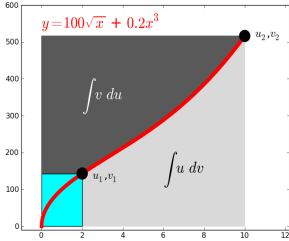


## Goals



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:

- use partial fractions where necessary for integration in simple cases
- integrate by parts.

## Theoretical Components

Read the notes and study the examples.

Partial Fractions:

- Notes and Examples - <https://goo.gl/NVHlsY>

Video Tutorial:

- <https://goo.gl/trwVMl>
- <https://goo.gl/ua6C8O>

Integration by Parts:

- Notes and Example - <https://goo.gl/NVHlsY>

Video Tutorials:

- <https://goo.gl/mijCzr>
- <https://goo.gl/OhtYvu> (loopy example)
- <https://goo.gl/srfhUw>

## Practical Components

Exercises: available in Google Classroom/ABOUT/Resources/S2/Term3/WK03

Set 1: Partial Fractions– attempt all even numbered questions.

Set 2: Integration by Parts – attempt odd numbered questions.

## Investigation

A: The study of sawtooth waves in electrical engineering leads to integrals of the form

$$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} t \sin(k\omega t) dt$$

where  $k$  is an integer and  $\omega$  is a nonzero constant. Evaluate the integral.

B: Use IBP to evaluate  $\int e^x \cos x dx$ .

20 marks