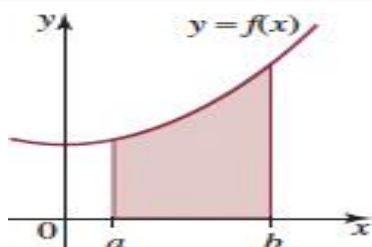


Goals



By the end of this week, you should be able to:

- Understand the use of areas of rectangles (and other shapes) to approximate the area under a given curve between defined intervals
- Understand the use of sigma notation and limits to approximate area under a curve
- Examine the area problem, and use sums of the form $\sum_i f(x_i) \delta x_i$ to estimate the area under the curve $y = f(x)$

Theoretical Components

Resources:

- Year 12 Maths Quest Methods Chapter 9

Read and make notes on worked examples 12 to 20.

Why do we study integration?

<https://www.intmath.com/integration/integration-intro.php>

Antiderivatives and The Indefinite Integral

<https://www.intmath.com/integration/2-indefinite-integral.php>

Watch this YouTube video:

Approximating area under a curve using rectangles:

<https://www.3blue1brown.com/lessons/integration>

Practical Components

Complete the following questions. Organise your solutions neatly in your exercise book.

You will require Chapter 9 of Maths Quest Methods (pdf – Google Classroom).

Ex 9C Integration by recognition

- Qs 1 (a,c,e), 2, 3, 4 (a,c), 5 (a,c), 7 (b), 13, 15 – 17

Ex 9D Approximating areas enclosed by functions

- Qs 1, 2, 4, 6, 8

Investigation

See separate page.

QFO

Quiz/Forum/Other

There is a Cambridge Task to complete.

Remember to check in with Serene at the start and end of each lesson.



Approximating areas under curves

- An approximation to the area between a curve and the x -axis can be found by dividing the area into a series of rectangles or trapeziums which are all the same width. The approximation is found by finding the sum of all the areas of the rectangles or trapeziums.
- Lower rectangle approximation \leq actual area \leq upper rectangle approximation
- Trapezoidal approximation =

$$\frac{\text{lower rectangle approximation} + \text{upper rectangle approximation}}{2}$$

- Trapezoidal rule is

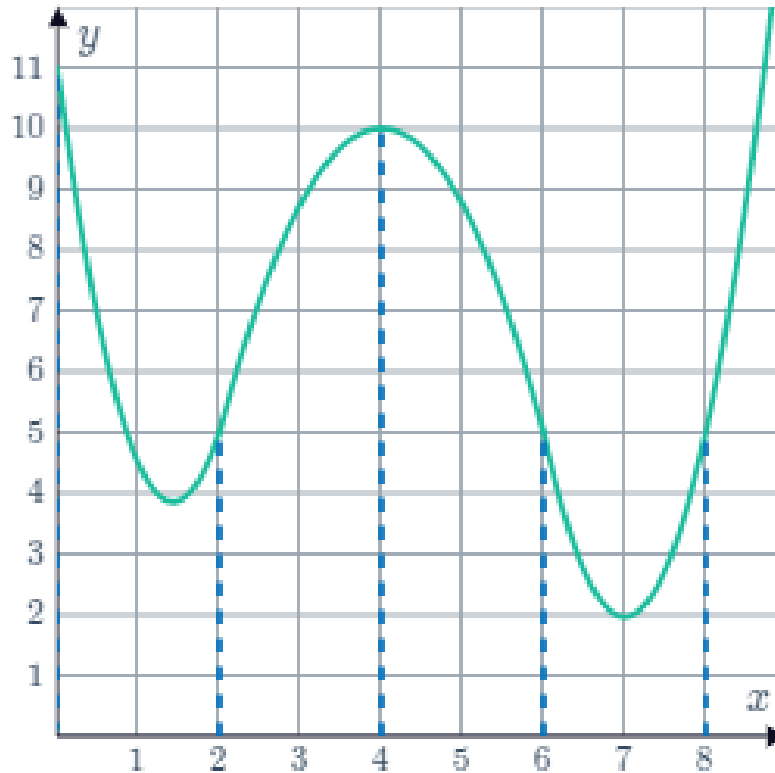
$$\int_a^b f(x) \, dx \cong \frac{h}{2} [f(a) + 2f(a+h) + 2f(a+2h) + \dots + 2f(b-h) + f(b)]$$

where h is the interval width.



MM3 Week 12 Investigation

Name: _____



1. Referring to the graph above, use an approximation method to approximate the area between the curve and the x -axis, from $x = 2$ to $x = 8$.

2. What method did you use?

3. How accurate do you think your answer is?

4. How could it be improved?