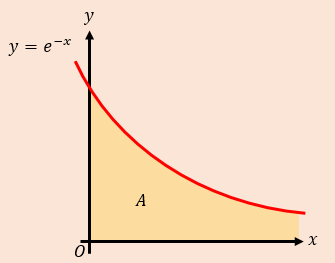
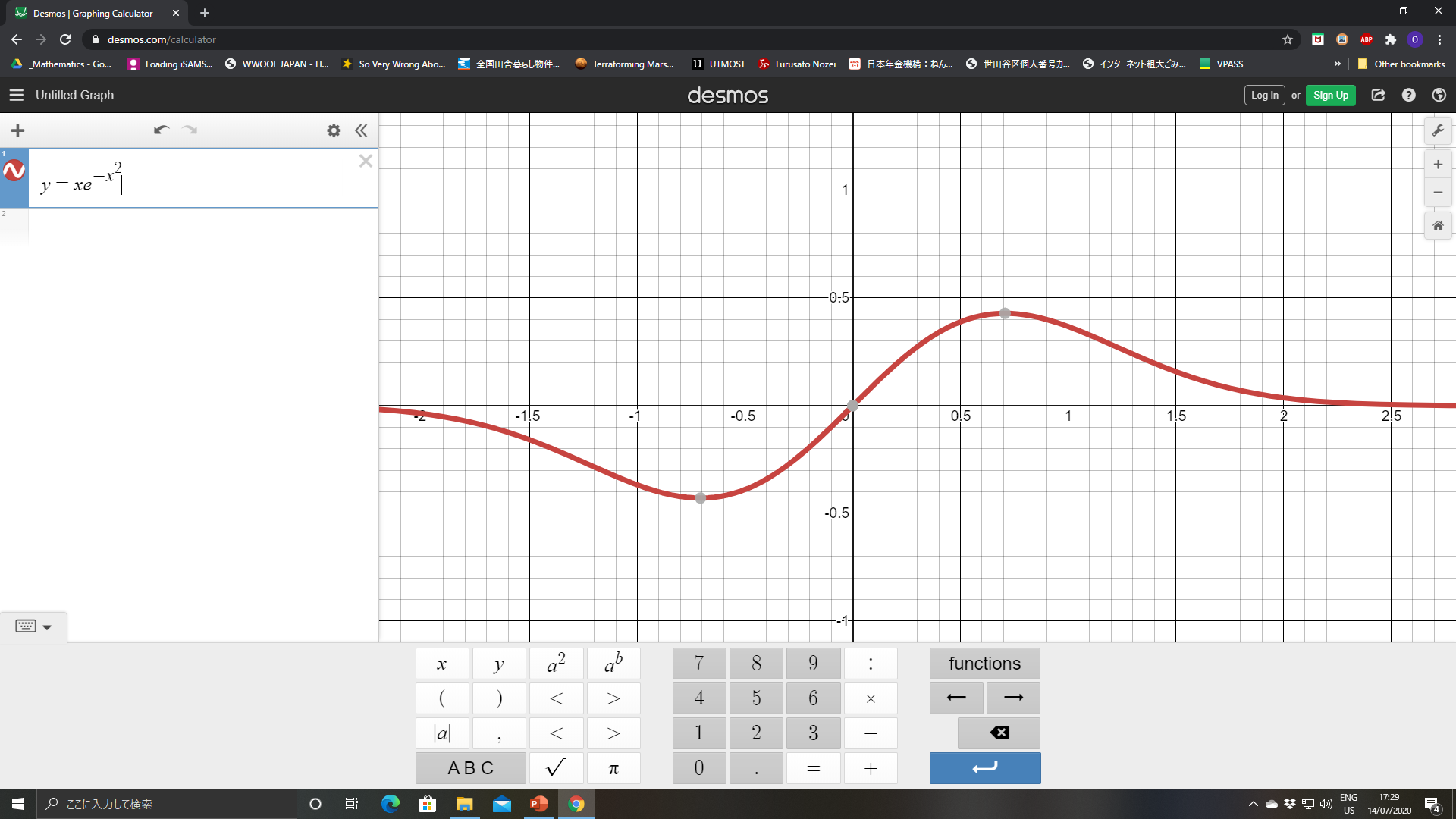
**3A Improper Integrals**

1. Calculate the area indicated in the diagram

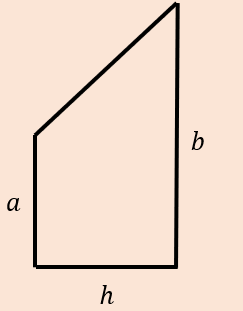
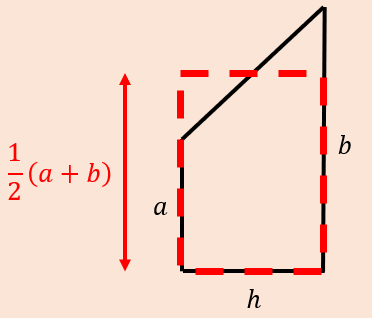


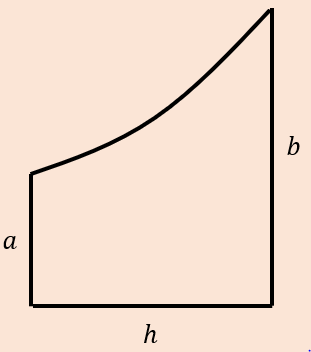
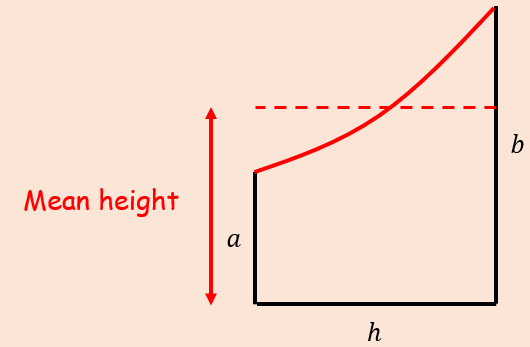
1. Evaluate the integral below, or show that it is not convergent.
2. Find
3. Hence, show that converges, and find its value

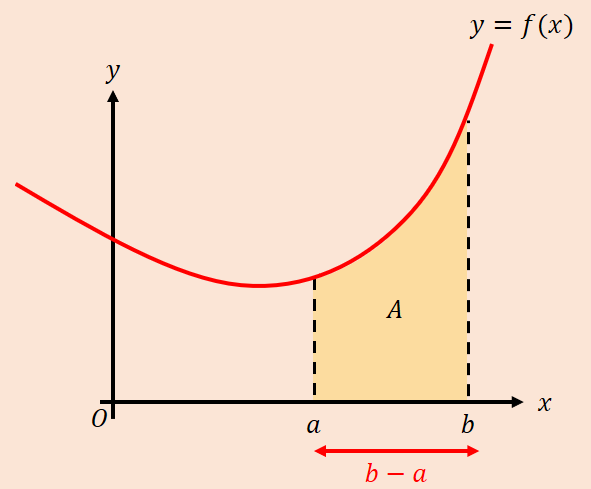
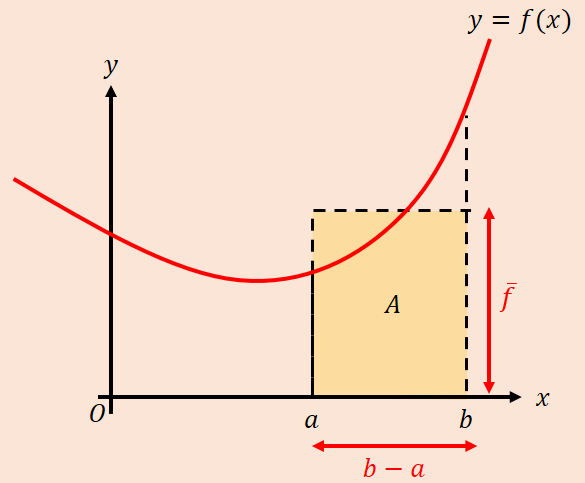
A final thought on positive and negative areas and the difference between ‘find the integral’, and ‘find the area’



**3B Mean Value of a Function**

1. Find the mean value of in the interval .
2. Given that
3. Show that the mean value of on the interval is
4. Use your answer to part a) to find the mean value of over the interval
5. Use geometric considerations to write down the mean value of over the interval

In General:

Vertical Transformations:

Horizontal Transformations:

**3C Differentiating Inverse Trig Functions**

1. Show that
2. Find
3. Given , find
4. Using implicit differentiation
5. Using the chain rule and the formula for

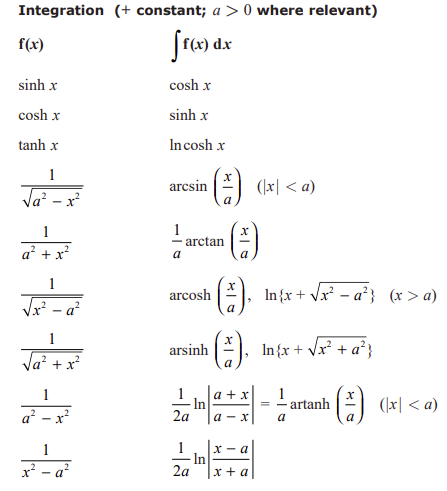
A Key point on the chain rule above: don’t just multiply by the derivative! (as x does not remain x in the derivative)

1. Given , find
2. Show that

**3D Integrating with Trig Substitutions**

1. Find the integral:

A reminder of the formula book



1. Find
2. Find
3. Evaluate the following, leaving your answer in terms of .
4. Find

**3E Integrating with Partial Fractions**

1. Prove that:
2. Show that:

where and are constants to be found.

1. Express the following as partial fractions
2. Hence, find: