

PROBLEM FORMULATION

A critical element in learning mathematics is problem formulation. This involves taking a description of a situation or problem and systematically producing a mathematical problem whose answer gives the answer to the original problem. In 142 this means we are talking about constructing appropriate definite integrals.

Starting with a description of the problem, here are the typical steps that will bring you to a proper problem formulation:

1. Determine what it is that you want to measure or compute. A picture or a diagram will often help.
2. Break it into simple parts. This can be done on your picture or diagram and should introduce a detail parameter like Δx or Δy or h .
3. Compute the value for one of the simple parts. It helps to carefully describe a typical simple part and to express the value as mathematically as possible.
4. Express an approximation of the value as a sum of the values for the parts.
5. Realize the exact value as the limit of the approximation as the number of parts grows to infinity or the detail parameter goes to 0. This is often how we even define the exact value.
6. Interpret the limit as a Riemann sum and thus as a definite integral.