

Solution to Homework 11

Task. Write a general program for computing an integral of a given function over a given range. Test it by showing how to compute the integral of x^2 on the interval $[0, 1]$.

Solution. A general method for computing the integral should have, e.g., the following form:

```
public static double integral(double a, double b, double delta_x){
    double sum = 0.0;
    double x = a;
    while(x <= b)
        {sum += delta_x * f(x);
         x += delta_x;}
    return sum;}

```

To test this method, you can do the following: add the actual testing in the main method, and add a method for computing $f(x) = x^2$:

```
public static void main(String[] args)
{System.out.println(integral(0.0, 1.0, 0.01);}

public static double f(double x){
    return x*x;}

```

For small Δx – e.g., for $\Delta x = 0.01$ – the resulting value should be close to

$$\int_0^1 x^2 dx = \left. \frac{x^3}{3} \right|_0^1 = \frac{1}{3} = 0.33\dots$$