

Computer Exercise 5.1.1

This program contains an algorithm written based on the pseudocode composite trapezoid rule with uniform spacing (on page 204 in the textbook**); the program also uses tests the algorithm on the indicated test function

$f(x) = \frac{1}{e^{x^2}}$ in the textbook using the same test parameters: $a = 0$, $b = 1$, $n = 60$. The objective is to match the

answer indicated in the textbook: $\int_0^1 f(x)dx \approx 0.74681$.

**Reference: Cheney, E.W. and Kincaid, D.R. Numerical Mathematics and Computing 7th edition

```
%initiate function
f = @(x) 1/exp(x^2);

%initiate parameters
n = 60;
a = 0;
b = 1;

%execute algorithm
I1 = Trapezoid_Uniform(f, a, b, n);

%display approximation
fprintf('integral approximation = %5.5f', I1)
```

```
integral approximation = 0.74681
```

We see that the approximation acquired here is exactly the same as the one acquired in the textbook.

```
function I = Trapezoid_Uniform(f, a, b, n)
    h = ((b-a)/n);
    sum = (1/2)*(f(a) + f(b));
    for k = 1:(n-1)
        xk = a + k*h;
        sum = sum + f(xk);
    end
    I = h*sum;
end
```