

1. Write an R-function, called `compTrap` that will implement the composite Trapezoid rule. The function should take as input: the function  $f$ , the lower and upper limits  $a$  and  $b$ , number of nodes `nref`. The output should be the value given by the rule. Using this compute the  $\int_0^2 f(x)dx$  when

$$f(x) = x^2, \quad \text{and} \quad f(x) = \frac{1}{(x+1)},$$

and the number of nodes are  $n = 1, 2, 3, 4$ .

2. Write an R-function, called `compSim` that will implement the composite Simpson rule. The function should take in as input: the function  $f$ , the lower and upper limits  $a$  and  $b$ , number of nodes `nref`. The program should output the integral value given by the rule. Using this compute the  $\int_0^2 f(x)dx$  when

$$f(x) = x^4, \quad \text{and} \quad f(x) = \sqrt{1+x^2}$$

and the number of nodes are  $n = 2, 4, 6$ .

3. We wish to compute the  $\int_0^\pi \sin(x)$  within  $2 \times 10^{-5}$  tolerance of the correct answer. Decide on whether one will use Composite Trapezoid or Composite Simpson to compute the integral. Based on this decision use the R-functions `compTrap` or `compSim` to compute the answer.