2019 MATH3201 Prac Week 4

(1) Let $f(x) = x - 1/x$. Use the trapezoidal rule with $h = 0.1$ and $h = 0.01$ to compute $\int_2^{10} f(x)dx$.

(2) Use Simpson's rule for the integral from (1) with the same step sizes.

(3) Use adaptive trapezoidal rule for the integral in (1) and use a tolerance of $\tau = 0.01$

Work on problems from last week:

(4) Find all of the roots of

$$f(x) = \sin^2(\pi x) + \sin^2\left(\frac{n\pi}{x}\right)$$

in the interval $(1, n)$ for $n = 15$ and then for $n = 91$. Comment on your results.

(5) Consider the function

$$f(x, y) = 5x^6 - 3x^2y + 7xe^{-xy} - 4y.$$

Find any local minima of $f(x, y)$ in the domain $D = [-8, 8]^2$. Explain your results. Find the global minima of $f(x, y)$ on D.