

Homework #2

Problem 1

- (a) Consider evaluating the function

$$y = \frac{1}{1 + 25x^2}$$

- by polynomial interpolation on the interval $[-1, 1]$ using equally spaced points. Use `Poly_interp` with 5 and 20 points. Compare values from `Poly_interp` with the exact values, especially near ± 1 . Comment on what you find—a graph would be nice.
- (b) Find the coefficients of the interpolating polynomials using `polcof` and/or `polcoe`. Evaluate the function from the coefficients. Comment.
- (c) Now use `Rat_interp` with 5 and 20 points. Compare values from `Rat_interp` with the exact values. Comment on what you find—a graph would be nice.

Problem 2

Use Heaviside calculus to obtain a formula of maximum order for

$$\int_0^{2h} f(x) dx$$

in terms of $f(0)$, $f(h)$, $f'(h)$, $f''(h)$, and $f(2h)$. Compare your formula with Simpson's rule, *Numerical Recipes* (4.1.4). If it is different, explain why.