

Umeå University

Department of Mathematics and Mathematical Statistics

Calculus in One Variable 7.5 p
5MA009 HT17

Computer Laboration

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1 Plot of the function $f(x) = x^{11} - 5x^2 + e^x - 5$

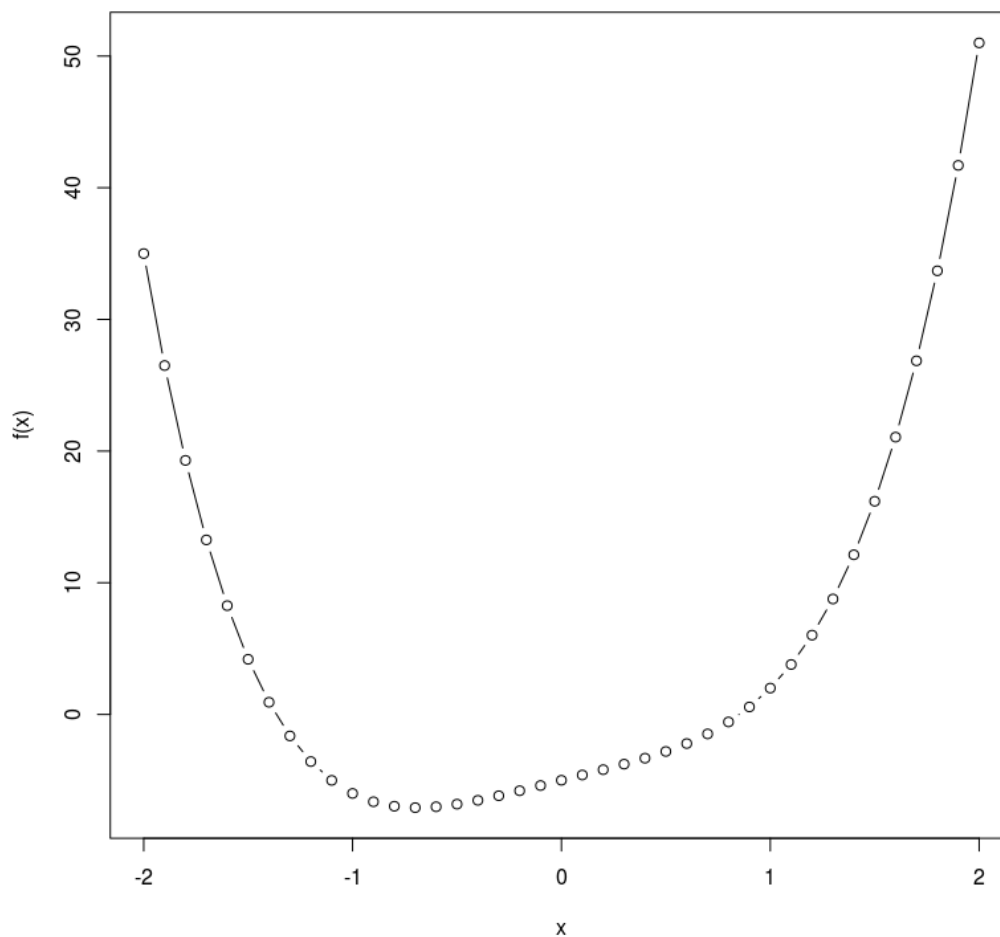


Figure 1: Plot of function $f(x) = x^{11} - 5x^2 + e^x - 5$ in the range from -2 to 2.

2 Code Listings

All calculations were done in R [1].

2.1 nderiv

```
nderiv = function (f, x, h) (f(x+h)-f(x))/h
```

2.2 newton

```
newton = function (f, x, n) {
  for(i in 1:n){
    x <- x-f(x)/nderiv(f,x,0.0001)
  }
}
```

2(2)

```
    return (x)
}
```

3 Numeric Solution of $x^{11} - 5x^2 + e^x = 5$

From the graph in exercise 1, $x = -1$ was chosen as start value for the `newton` program. The iteration was run with $n = \{1, 10, 100\}$ which resultet for the two latter values in an approximation of $y = -1.3667$.

4 Local minima of $f(x) = x^{11} - 5x^2 + e^x - 5$

5 Find $f^{-1}(3)$ where $f(x) = x^{11} - 5x^2 + e^x - 5$

References

- [1] R Core Team. *R: A Language and Environment for Statistical Computing*. R Foundation for Statistical Computing, Vienna, Austria, 2015.