2016WS_HSA_WiMa_Funktionen_16_11_09.R

ste

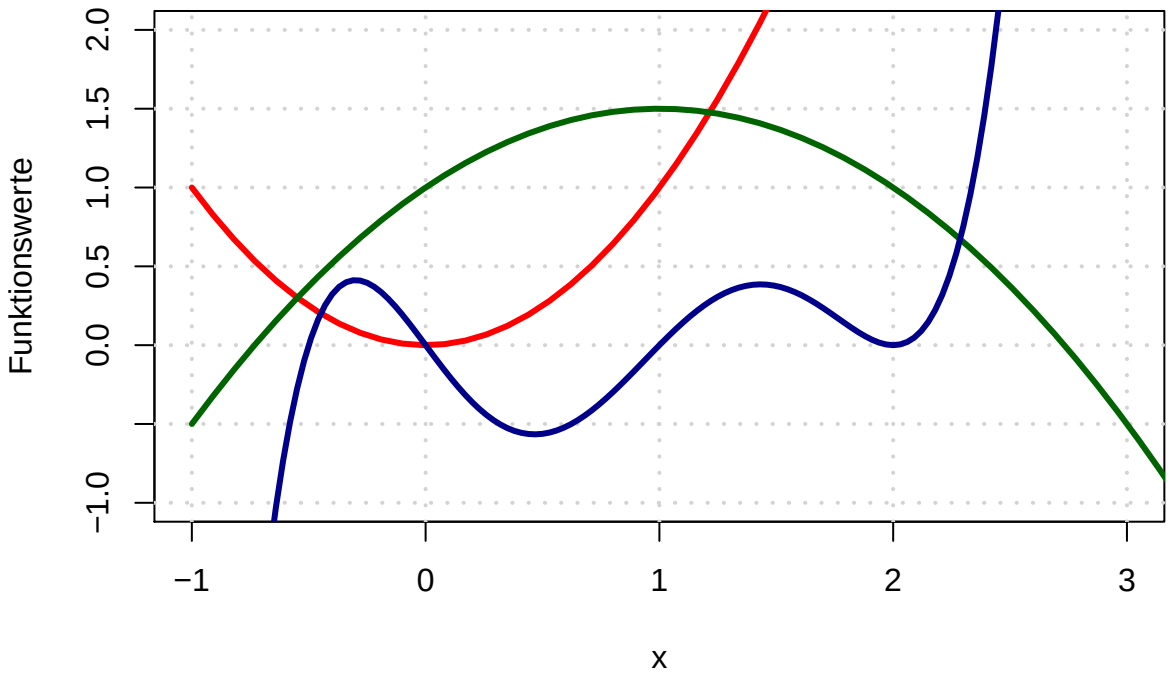
Wed Nov 09 16:02:29 2016

```
# 2.11.2016
# R Skript zur VL WiMa
```

```
# Funktionsgraphen
```

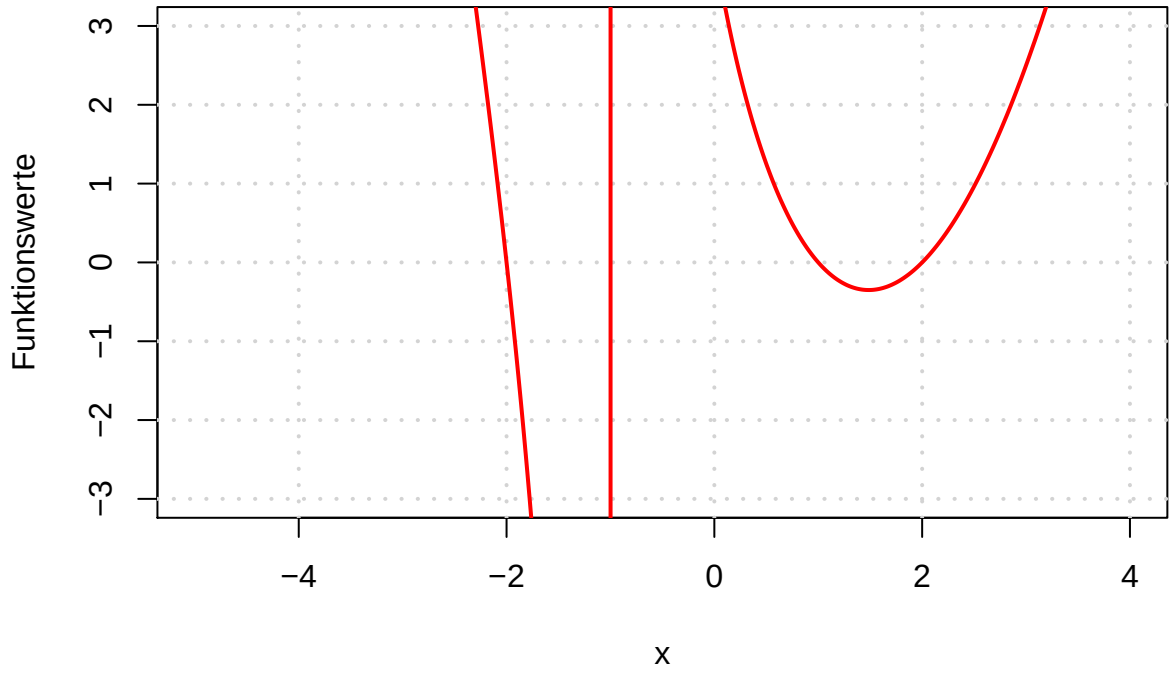
```
# Polynome
```

```
polynom1 = function(x) {x^2}
polynom2 = function(x) {-0.5*x^2 + x + 1}
polynom3 = function(x) {x^5-4.5* x^4 + 5.5* x^3-2* x}

plot(c(-1,3), c(-1,2), type="n",
     xlab="x", ylab="Funktionswerte") # leeres Koordinatensystem
grid(lwd=2)                           # lwd: line width

curve(polynom1, from=-1, to=8, lwd=3, col="red", add=TRUE)
curve(polynom2, from=-1, to=8, lwd=3, col="darkgreen", add=TRUE)
curve(polynom3, from=-1, to=8, lwd=3, col="darkblue", add=TRUE, n=301)
```

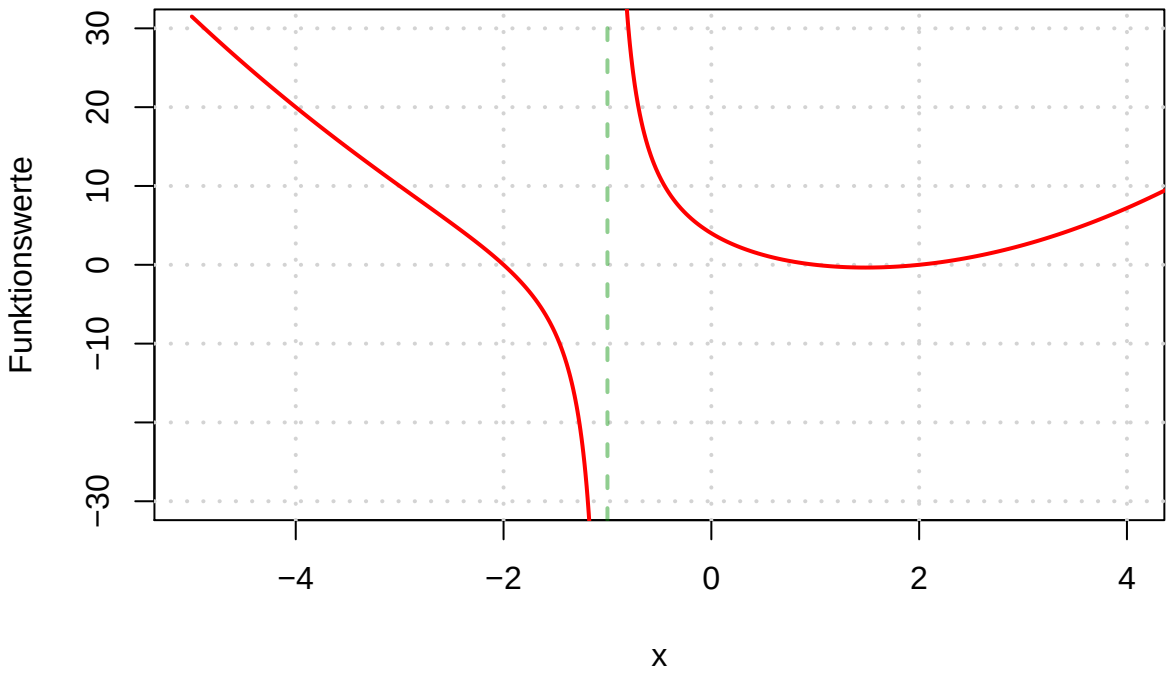


```r
# Rationale Funktion
```

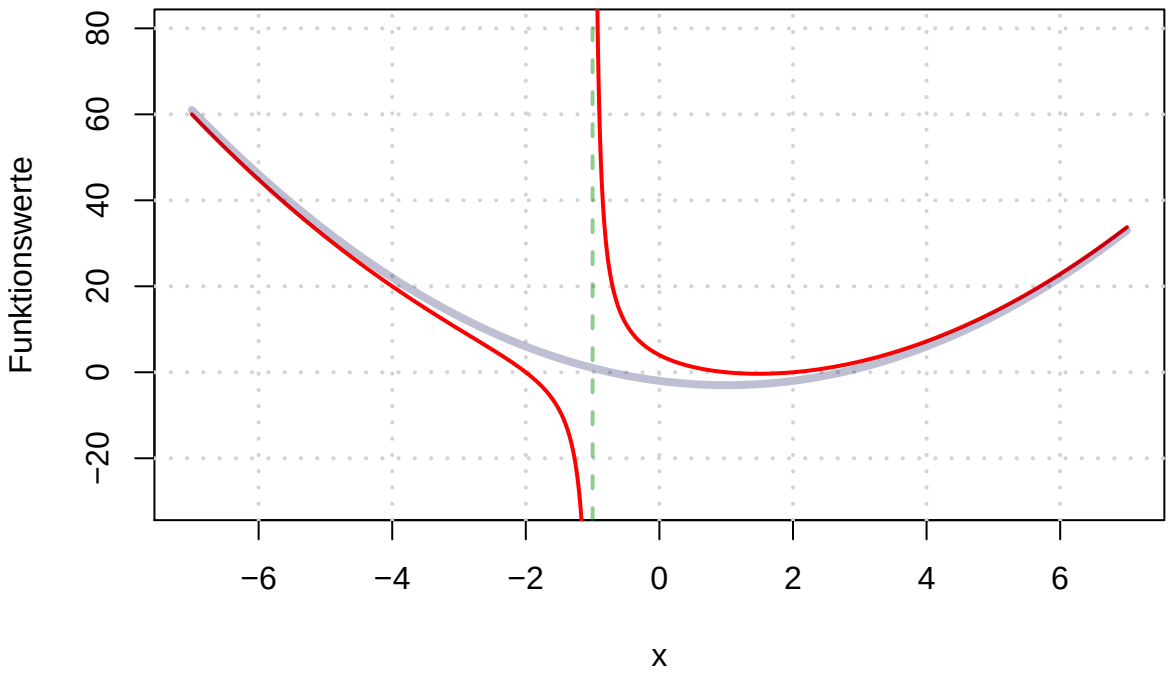
```r
Rational1 = function(x) {(x^3-x^2-4* x+4)/(x+1)}
plot(c(-5,4), c(-3,3), type="n",
     xlab="x", ylab="Funktionswerte") # leeres Koordinatensystem
grid(lwd=2)                           # lwd: line width
curve(Rational1, from=-5, to=4, lwd=2, col="red", add=TRUE, n=1001)
```




```r
# Pol bei x=-1
plot(c(-5,4), c(-30,30), type="n",
     xlab="x", ylab="Funktionswerte") # leeres Koordinatensystem
grid(lwd=2)                           # lwd: line width
curve(Rational1, from=-5, to=-1, lwd=2, col="red", add=TRUE, n=1001)
curve(Rational1, from=-1, to=5, lwd=2, col="red", add=TRUE, n=1001)
abline(v = -1, lty=2, lwd=2, col="#00900070")
```




```
# Asymptote (Polynom nach Division, ohne Rest)
Asymptote = function(x) {x^2-2*x-2}
plot(c(-7,7), c(-30,80), type="n",
     xlab="x", ylab="Funktionswerte") # leeres Koordinatensystem
grid(lwd=2)                           # lwd: line width
curve(Rational1, from=-7, to=-1, lwd=2, col="red", add=TRUE, n=1001)
curve(Rational1, from=-1, to=7, lwd=2, col="red", add=TRUE, n=1001)
abline(v = -1, lty=2, lwd=2, col="#00900070")
curve(Asymptote, from=-7, to=7, lwd=4, col="#00005040", add=TRUE)
```

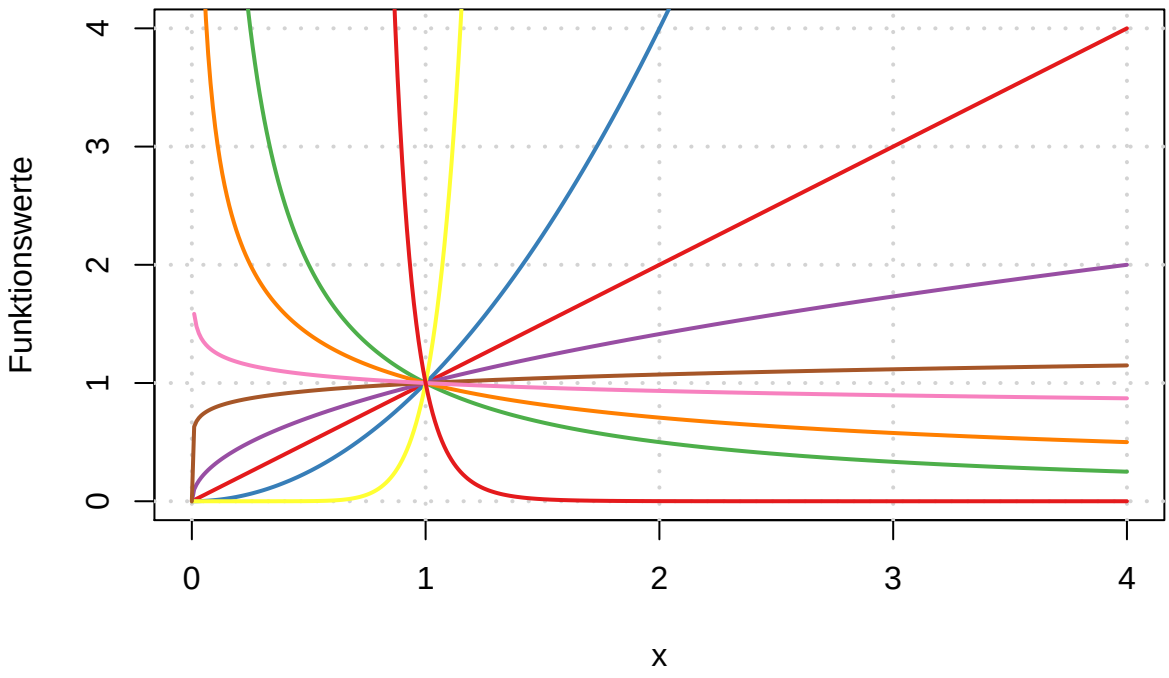



```
# Potenzfunktionen
```

```
PotenzGraph = function(a=1, Farbe="red") {
  curve(x^a, from=0, to=4, lwd=2, col=Farbe, add=TRUE, n=401)
}

plot(c(0,4), c(0,4), type="n",
     xlab="x", ylab="Funktionswerte") # leeres Koordinatensystem
grid(lwd=2)                           # lwd: line width

# RColorBrewer
# install.packages("RColorBrewer")
library(RColorBrewer)
```

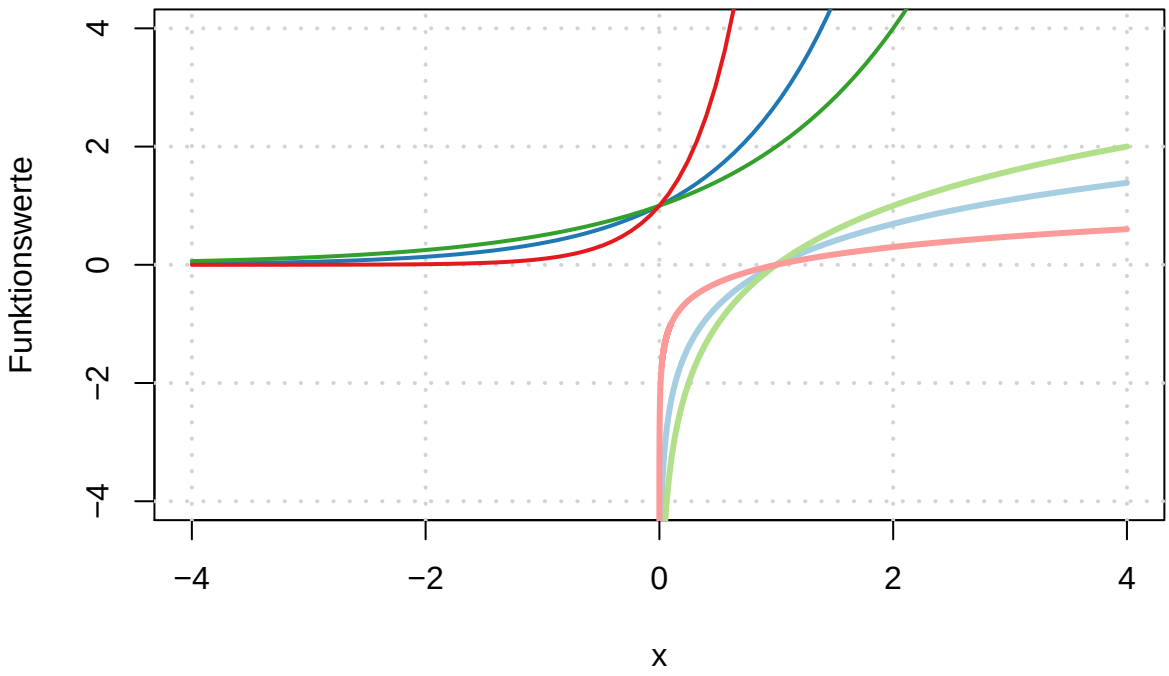
```
## Warning: package 'RColorBrewer' was built under R version 3.3.2
```

```
Farben = brewer.pal(9,"Set1")
PotenzGraph(a=1, Farbe=Farben[1])
PotenzGraph(a=2, Farbe=Farben[2])
PotenzGraph(a=-1, Farbe=Farben[3])
PotenzGraph(a=0.5, Farbe=Farben[4])
PotenzGraph(a=-0.5, Farbe=Farben[5])
PotenzGraph(a=10, Farbe=Farben[6])
PotenzGraph(a=0.1, Farbe=Farben[7])
PotenzGraph(a=-0.1, Farbe=Farben[8])
PotenzGraph(a=-10, Farbe=Farben[1])
```



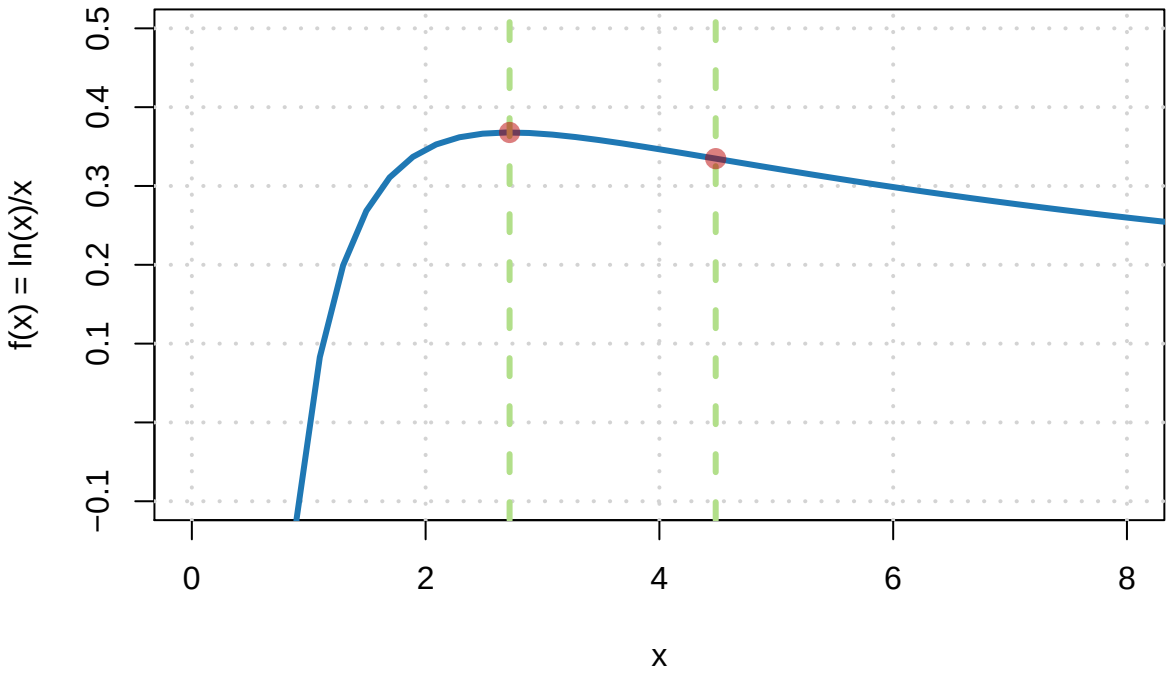

```
# Exponential- und Logarithmusfunktionen
```

```
plot(c(-4,4), c(-4,4), type="n",
     xlab="x", ylab="Funktionswerte") # leeres Koordinatensystem
grid(lwd=2)                           # lwd: line width

Farben = brewer.pal(9,"Paired")

# Logarithmus naturalis und e-Funktion
curve(log(x), from=0, to=4, lwd=3, col=Farben[1], add=TRUE, n=301)
curve(exp(x), from=-4, to=4, lwd=2, col=Farben[2], add=TRUE)

# Basis 2
curve(log(x)/log(2), from=0, to=4, lwd=3, col=Farben[3], add=TRUE, n=301)
curve(2^x, from=-4, to=4, lwd=2, col=Farben[4], add=TRUE)

# Basis 10
curve(log(x)/log(10), from=0, to=0.1, lwd=3, col=Farben[5], add=TRUE, n=3001)
curve(log(x)/log(10), from=0.1, to=4, lwd=3, col=Farben[5], add=TRUE, n=301)
curve(10^x, from=-4, to=4, lwd=2, col=Farben[6], add=TRUE)
```




```
# Beispiel Montonie/Konvexität
```

```
f = function(x) {log(x)/x}
plot(c(0,8), c(-0.1,0.5), type="n",
     xlab="x", ylab="f(x) = ln(x)/x") # leeres Koordinatensystem
grid(lwd=2)                           # lwd: line width
curve(f, from=0.1, to=20, lwd=3, col=Farben[2], add=TRUE)
x = c(exp(1), exp(3/2))
abline(v = x, lty=2, lwd=3, col=Farben[3])
points(x, f(x), pch=20, col="#bb000080", cex=2)
```


f(x) = ln(x)/x
0.5
0.4
0.3
0.2
0.1
−0.1
0
2
4
6
8
x