テーラー展開のグラフ　：　$y = f(x) = \log(1+x)$ の場合

$f(x) = \log(1+x)$

$f_n(x) = \sum_{k=0}^{n} \frac{f^{(k)}(0)}{k!} x^k$　：　$f(x)$ のテーラー展開（級数）の x の べき が 0 乗から n 乗までの項の和。

具体的な形は：

$f_1(x) = x$

$f_2(x) = x - \frac{1}{2}x^2$

$f_3(x) = x - \frac{1}{2}x^2 + \frac{1}{3}x^3$

$f_4(x) = x - \frac{1}{2}x^2 + \frac{1}{3}x^3 - \frac{1}{4}x^4$

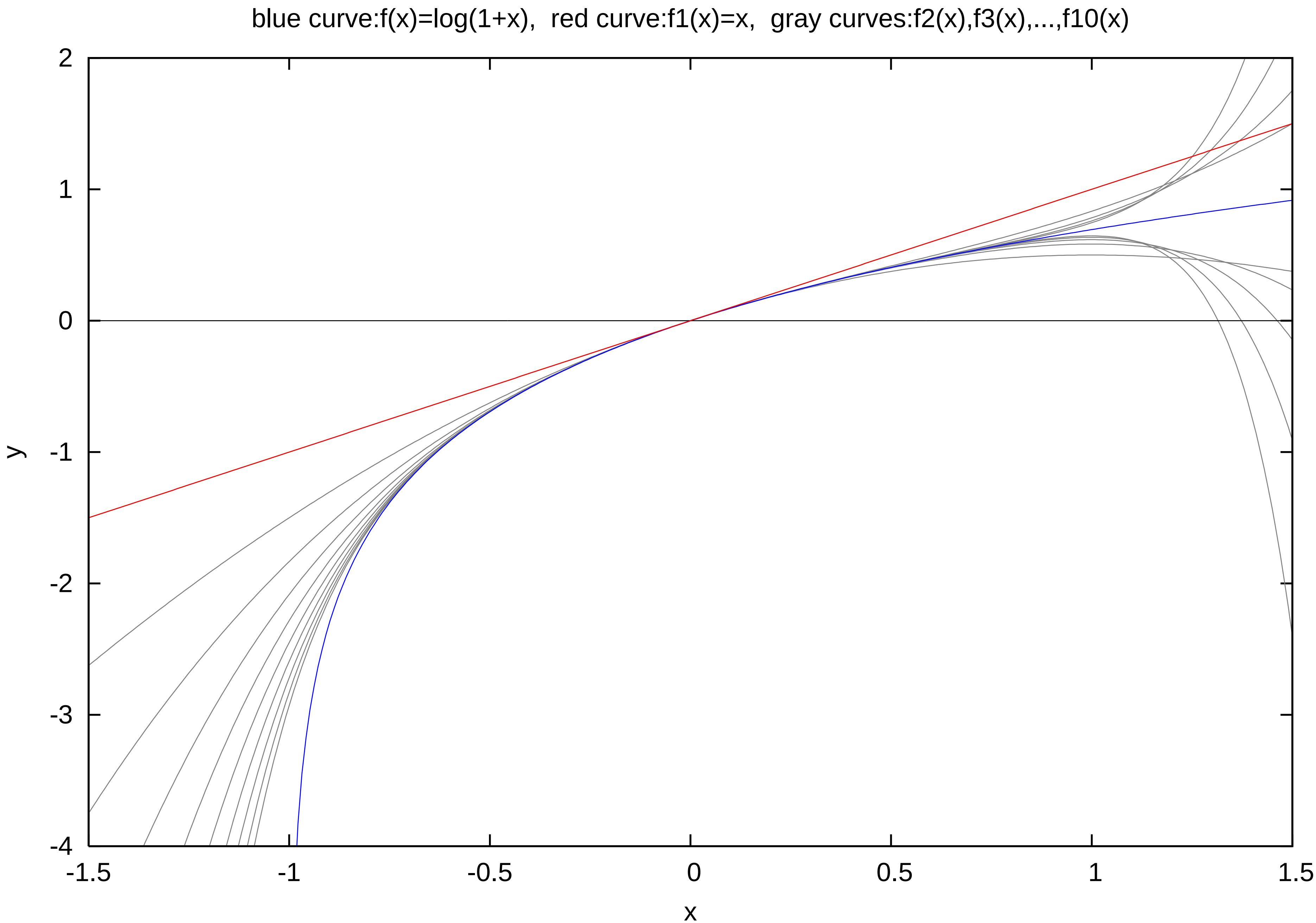
$f_5(x) = x - \frac{1}{2}x^2 + \frac{1}{3}x^3 - \frac{1}{4}x^4 + \frac{1}{5}x^5$

$f_6(x) = x - \frac{1}{2}x^2 + \frac{1}{3}x^3 - \frac{1}{4}x^4 + \frac{1}{5}x^5 - \frac{1}{6}x^6$

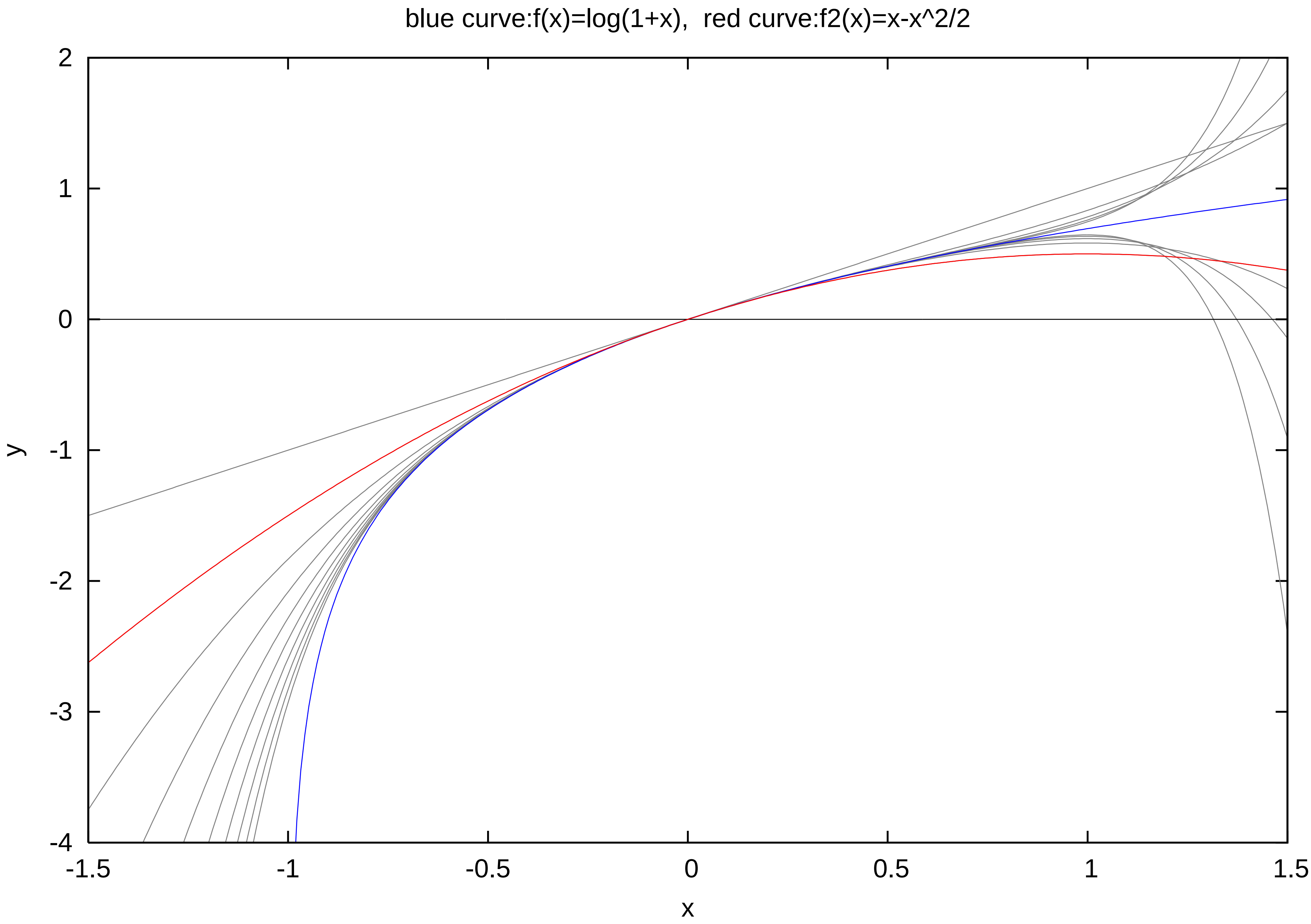
$f_7(x) = x - \frac{1}{2}x^2 + \frac{1}{3}x^3 - \frac{1}{4}x^4 + \frac{1}{5}x^5 - \frac{1}{6}x^6 + \frac{1}{7}x^7$

$\cdots$

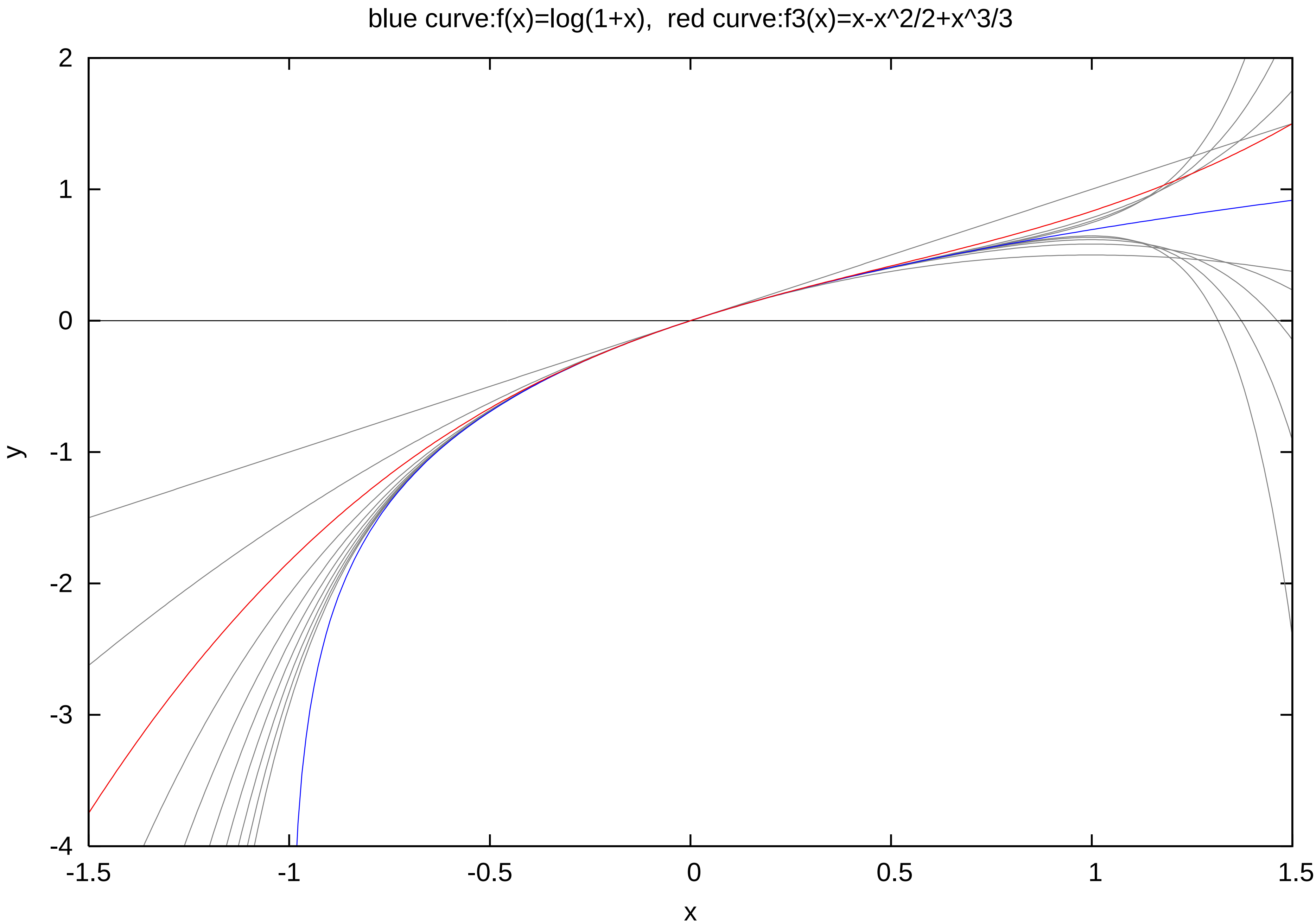
【注】$\log(1+x)$ のテーラー展開の収束半径は 1 である。即ち、$|x| < 1$ で $f_n(x) \to f(x)$ $(n \to \infty)$ となるが、$|x| > 1$ では $f_n(x)$ は $n \to \infty$ で発散する。

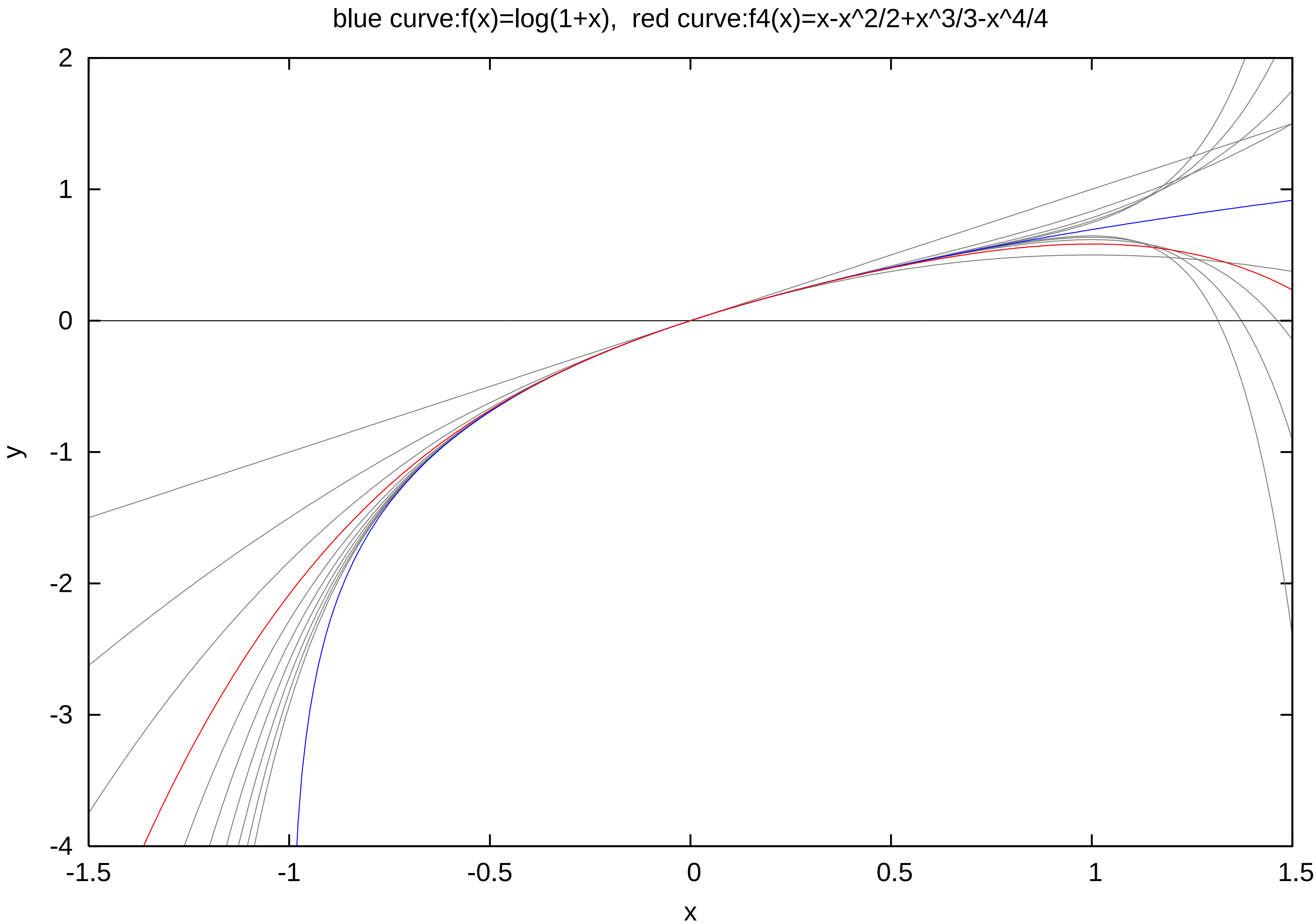


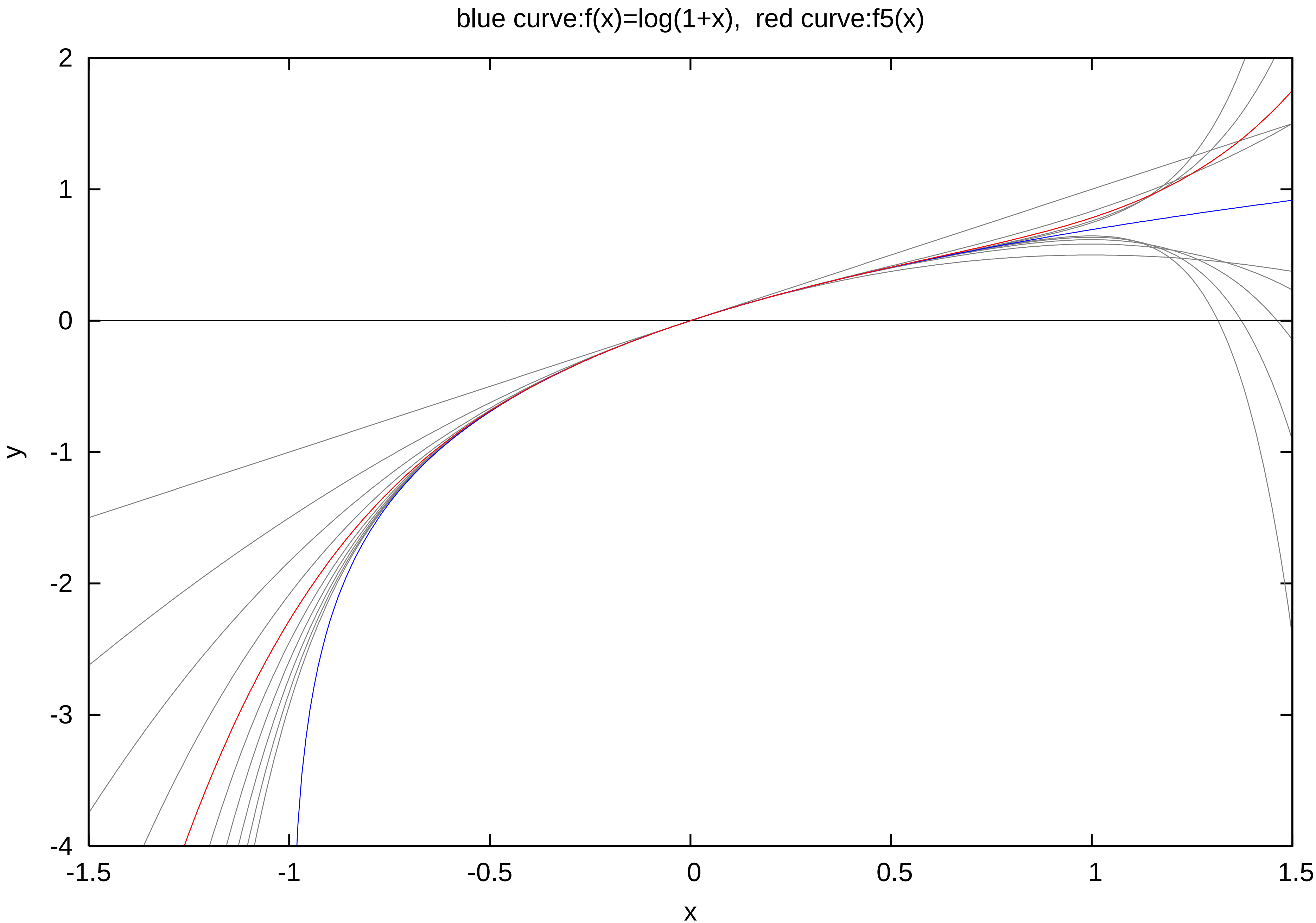
blue curve:f(x)=log(1+x), red curve:f1(x)=x, gray curves:f2(x),f3(x),...,f10(x)
2
1
0
-1
-2
-3
-4
y
-1.5
-1
-0.5
0
0.5
1
1.5
x

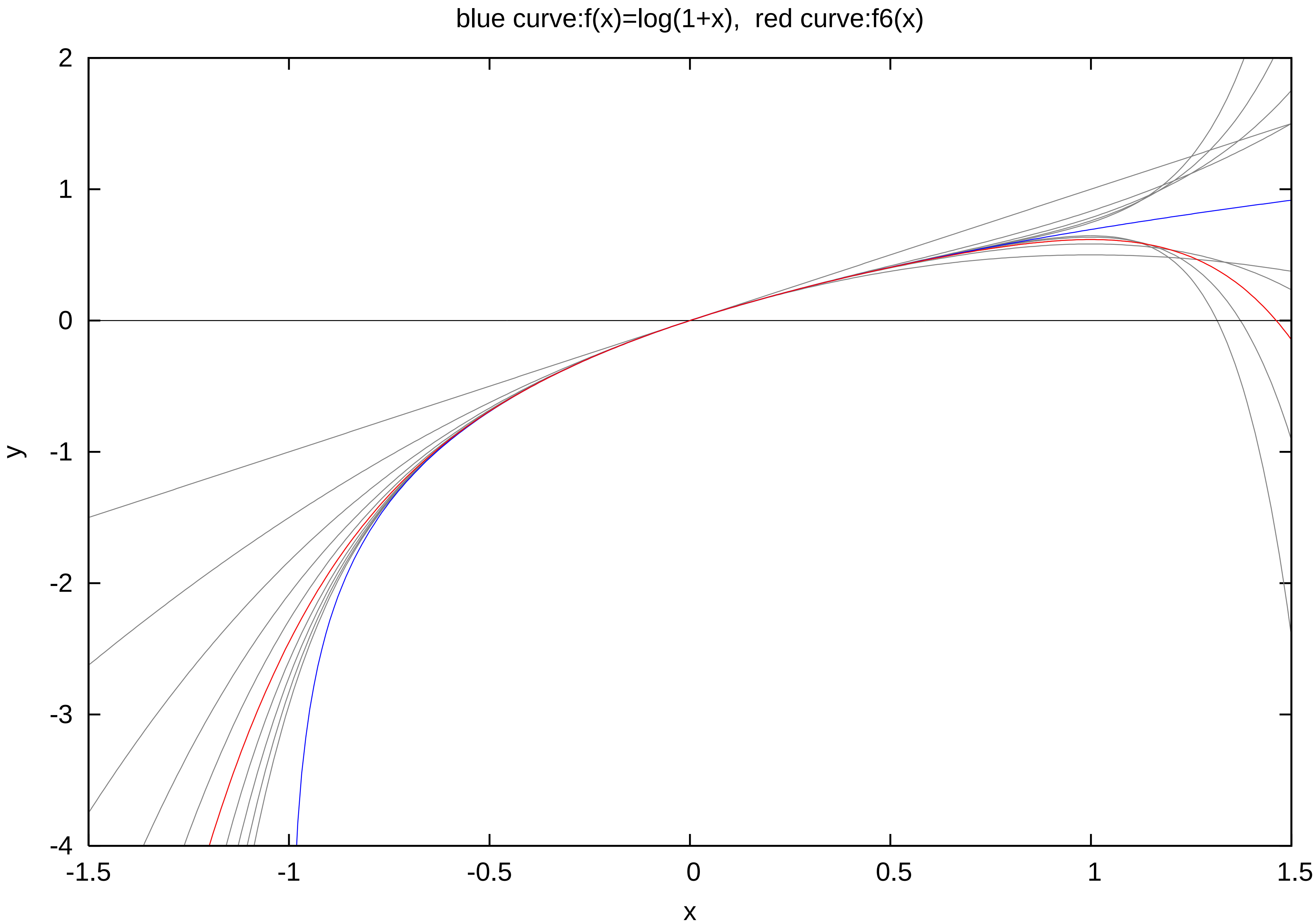


blue curve:f(x)=log(1+x), red curve:f2(x)=x-x^2/2
2
1
0
-1
-2
-3
-4
y
-1.5
-1
-0.5
0
0.5
1
1.5
x

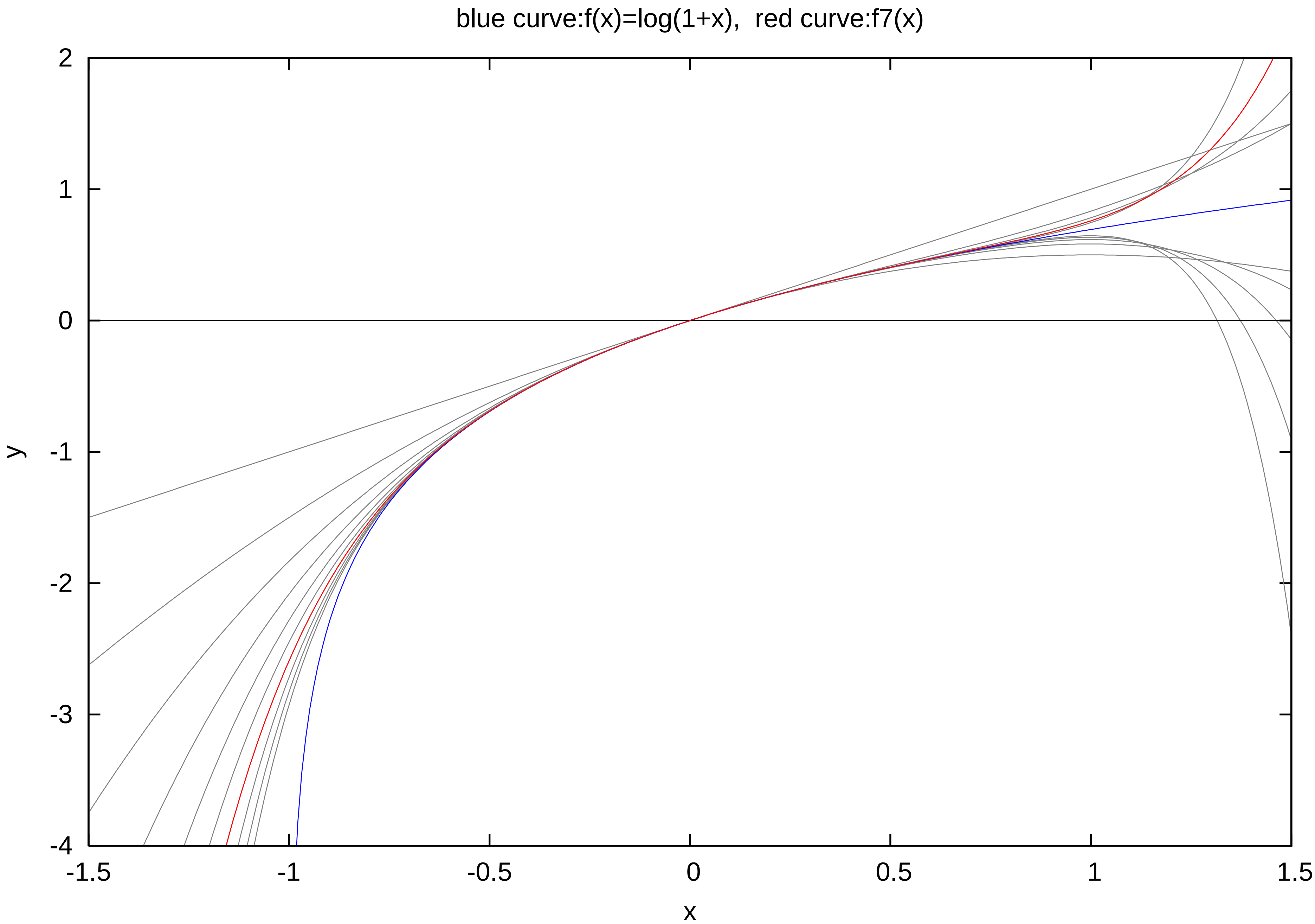

blue curve:f(x)=log(1+x), red curve:f3(x)=x-x^2/2+x^3/3
2
1
0
-1
-2
-3
-4
y
-1.5
-1
-0.5
0
0.5
1
1.5
x


blue curve:f(x)=log(1+x), red curve:f4(x)=x-x^2/2+x^3/3-x^4/4
y
x
2
1
0
-1
-2
-3
-4
-1.5
-1
-0.5
0
0.5
1
1.5

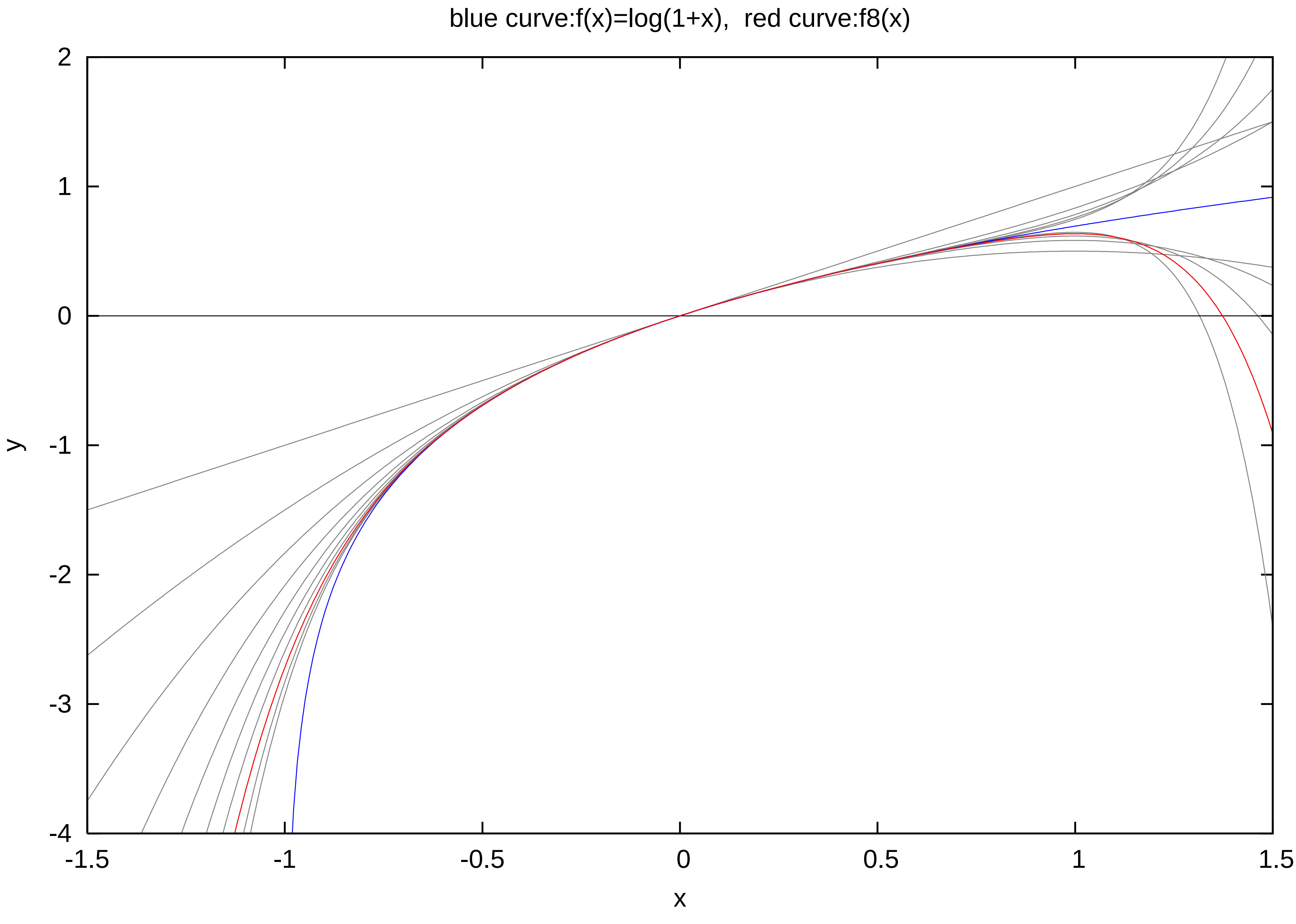

blue curve:f(x)=log(1+x), red curve:f5(x)
2
1
0
-1
-2
-3
-4
y
-1.5
-1
-0.5
0
0.5
1
1.5
x



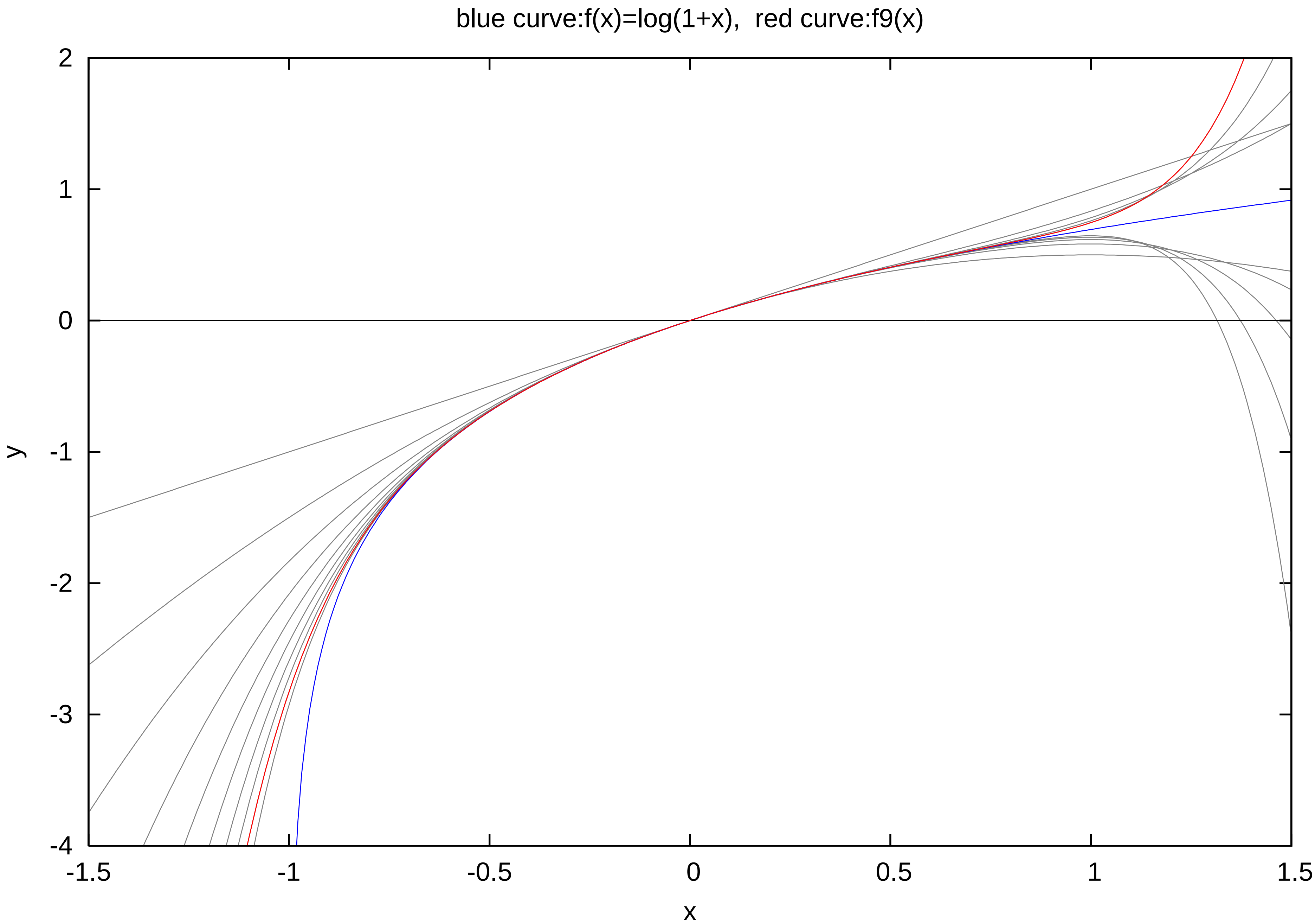
blue curve:f(x)=log(1+x), red curve:f6(x)
2
1
0
-1
-2
-3
-4
y
-1.5
-1
-0.5
0
0.5
1
1.5
x

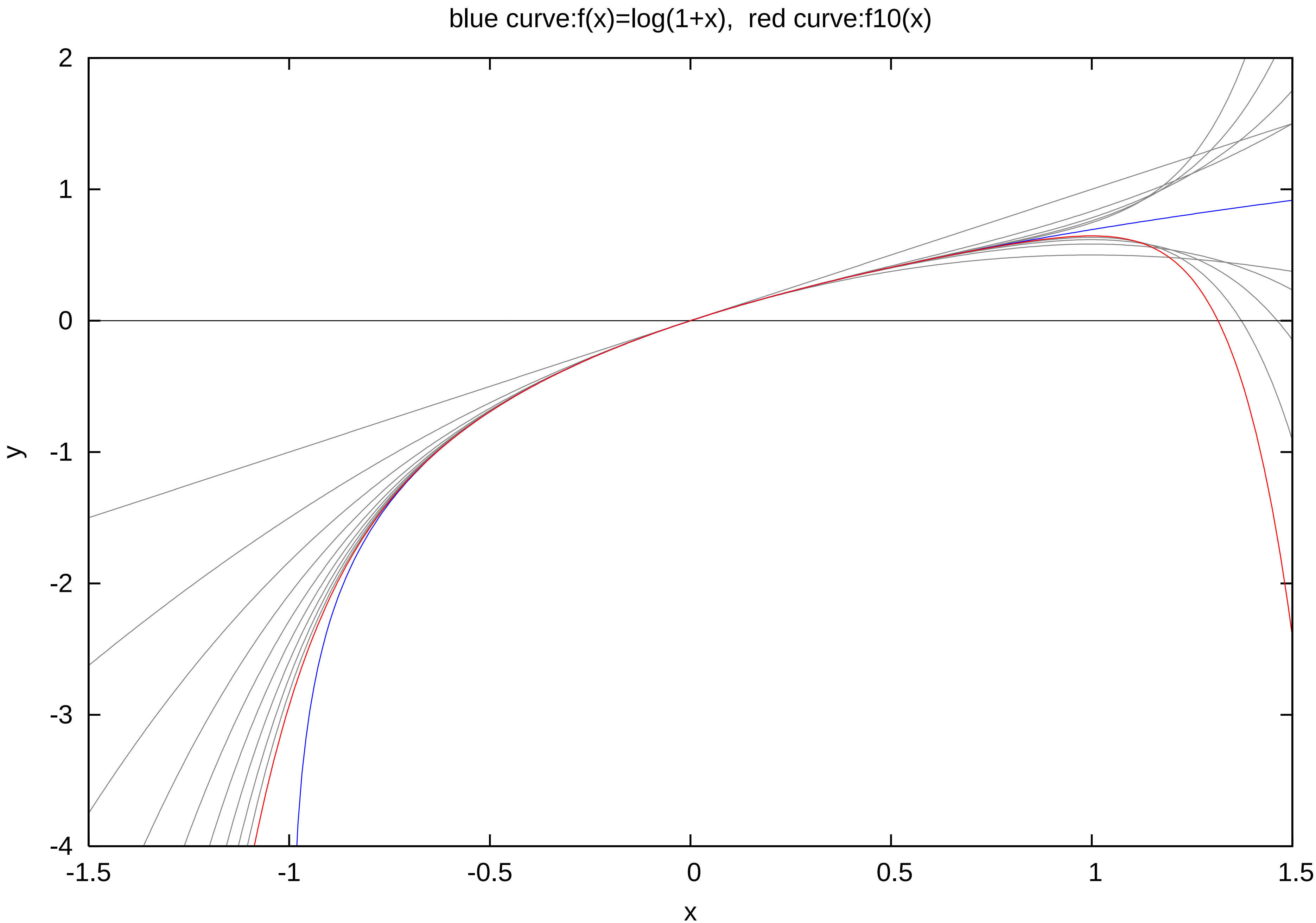


blue curve:f(x)=log(1+x), red curve:f7(x)
2
1
0
-1
-2
-3
-4
y
-1.5
-1
-0.5
0
0.5
1
1.5
x

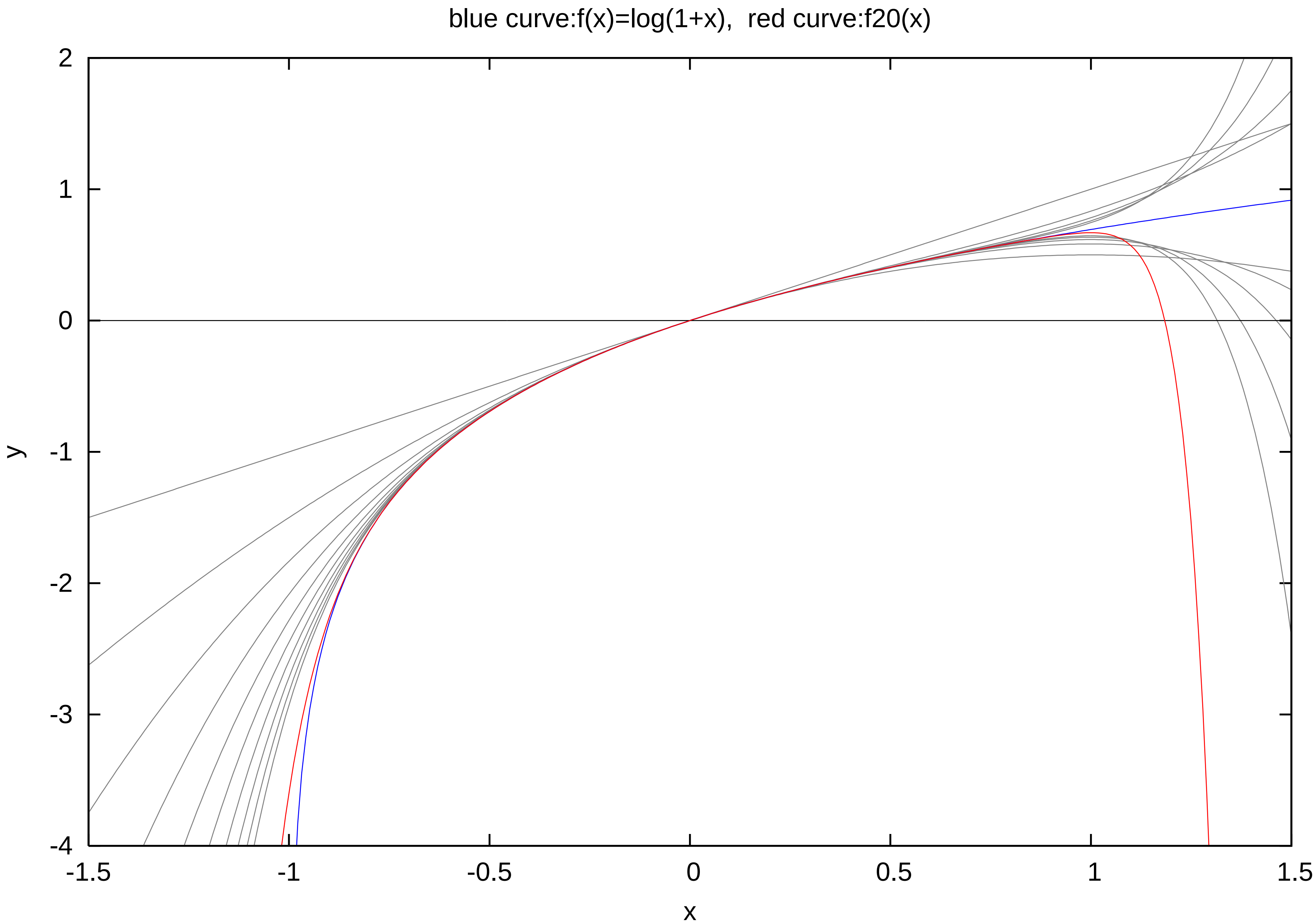


blue curve:f(x)=log(1+x), red curve:f8(x)
2
1
0
-1
-2
-3
-4
y
-1.5
-1
-0.5
0
0.5
1
1.5
x

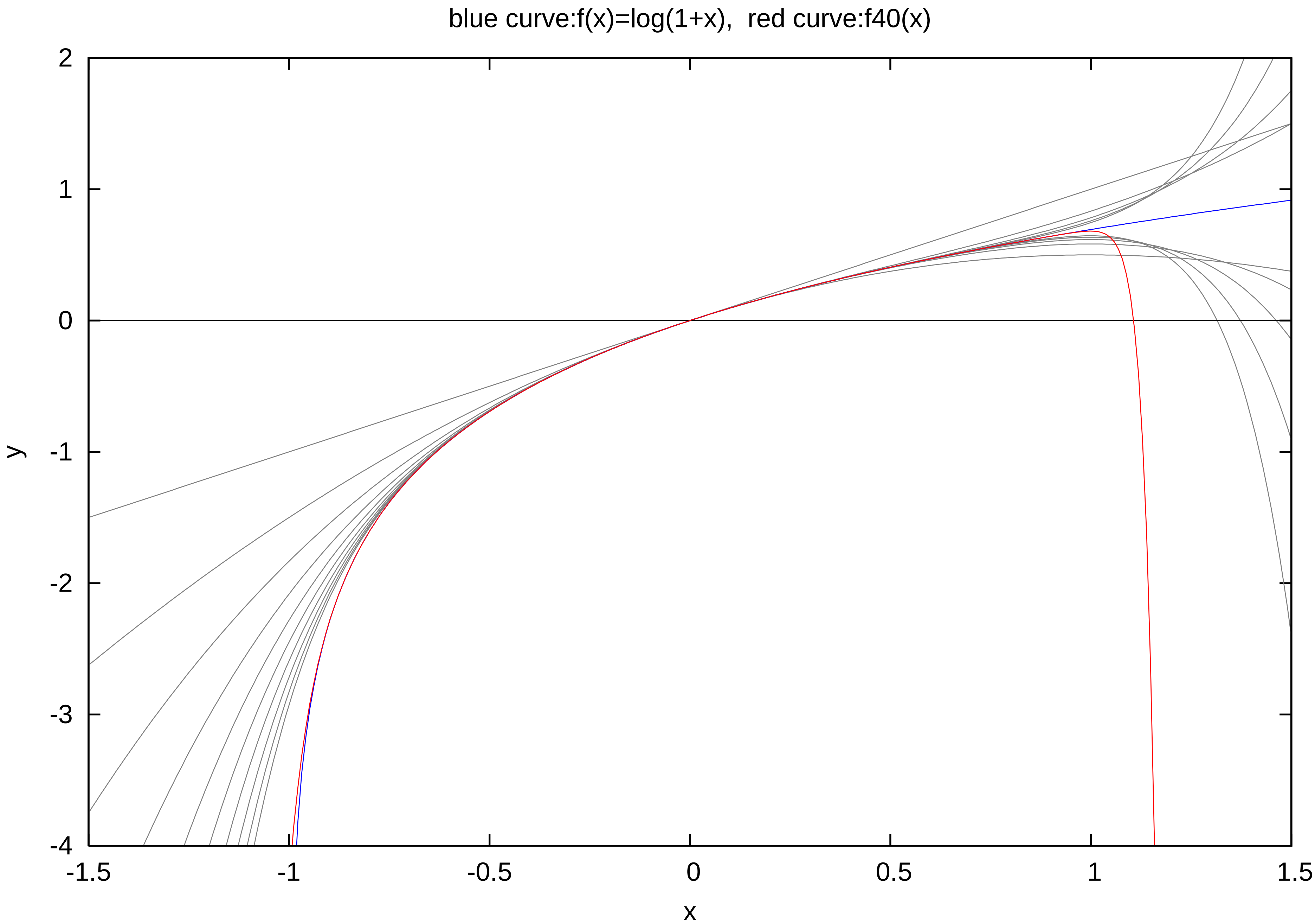

blue curve:f(x)=log(1+x), red curve:f9(x)
2
1
0
-1
-2
-3
-4
y
-1.5
-1
-0.5
0
0.5
1
1.5
x

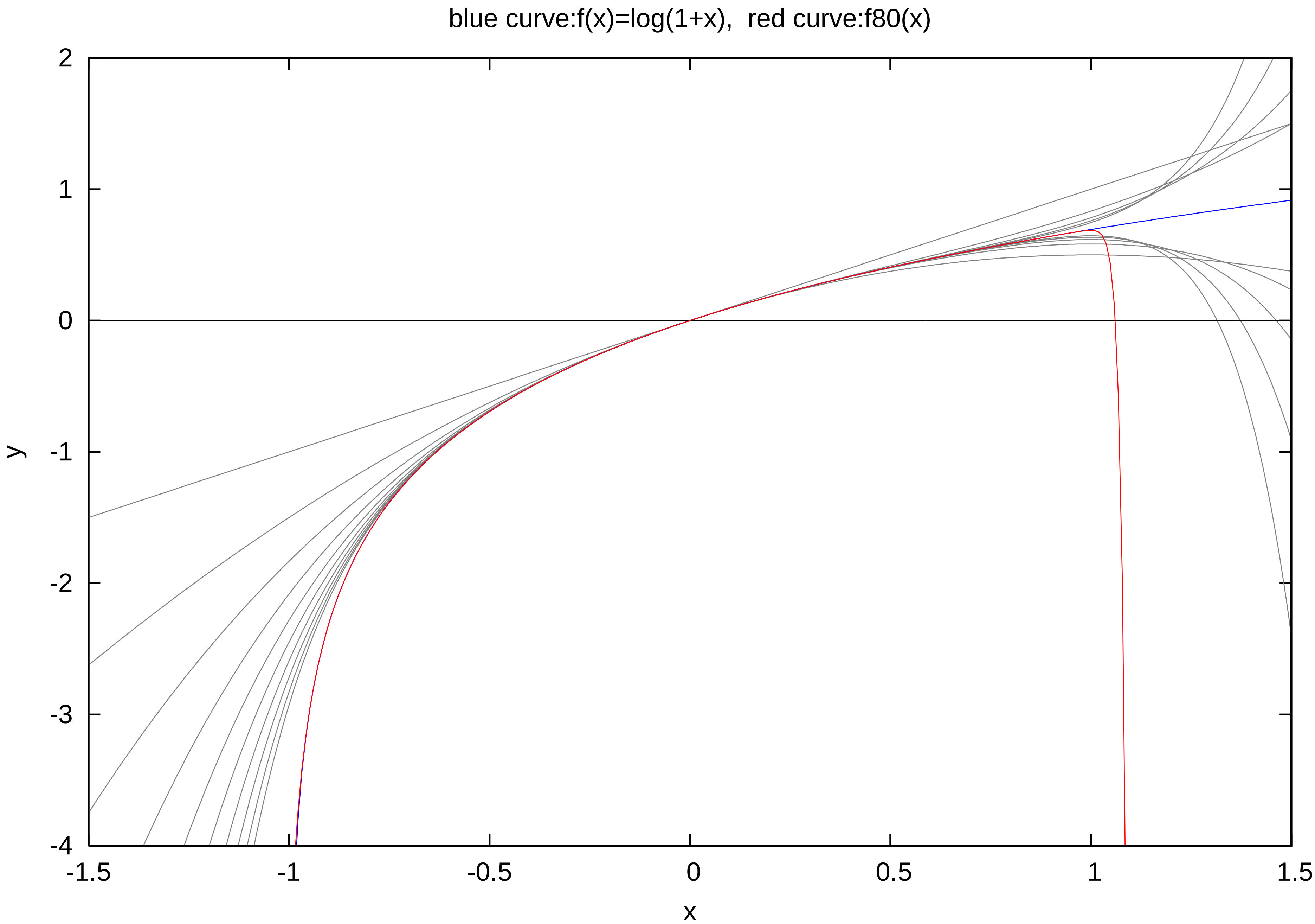


blue curve:f(x)=log(1+x), red curve:f10(x)
2
1
0
-1
-2
-3
-4
y
-1.5
-1
-0.5
0
0.5
1
1.5
x



blue curve:f(x)=log(1+x), red curve:f20(x)
2
1
0
-1
-2
-3
-4
y
-1.5
-1
-0.5
0
0.5
1
1.5
x


blue curve:f(x)=log(1+x), red curve:f40(x)
2
1
0
-1
-2
-3
-4
y
-1.5
-1
-0.5
0
0.5
1
1.5
x


blue curve:f(x)=log(1+x), red curve:f80(x)
2
1
0
-1
-2
-3
-4
y
-1.5
-1
-0.5
0
0.5
1
1.5
x

blue curve:f(x)=log(1+x), red curve:f81(x)