テーラー展開のグラフ　：　$y=f(x)=\sin\ x$ の場合

$f(x)=\sin\ x$

$f_n(x)=\sum_{k=0}^{n}\frac{f^{(k)}(0)}{k!}x^k$　：　$f(x)$ 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：

$f_1(x)=x$

$f_3(x)=x-\frac{1}{6}x^3$

$f_5(x)=x-\frac{1}{6}x^3+\frac{1}{120}x^5$

$f_7(x)=x-\frac{1}{6}x^3+\frac{1}{120}x^5-\frac{1}{5040}x^7$

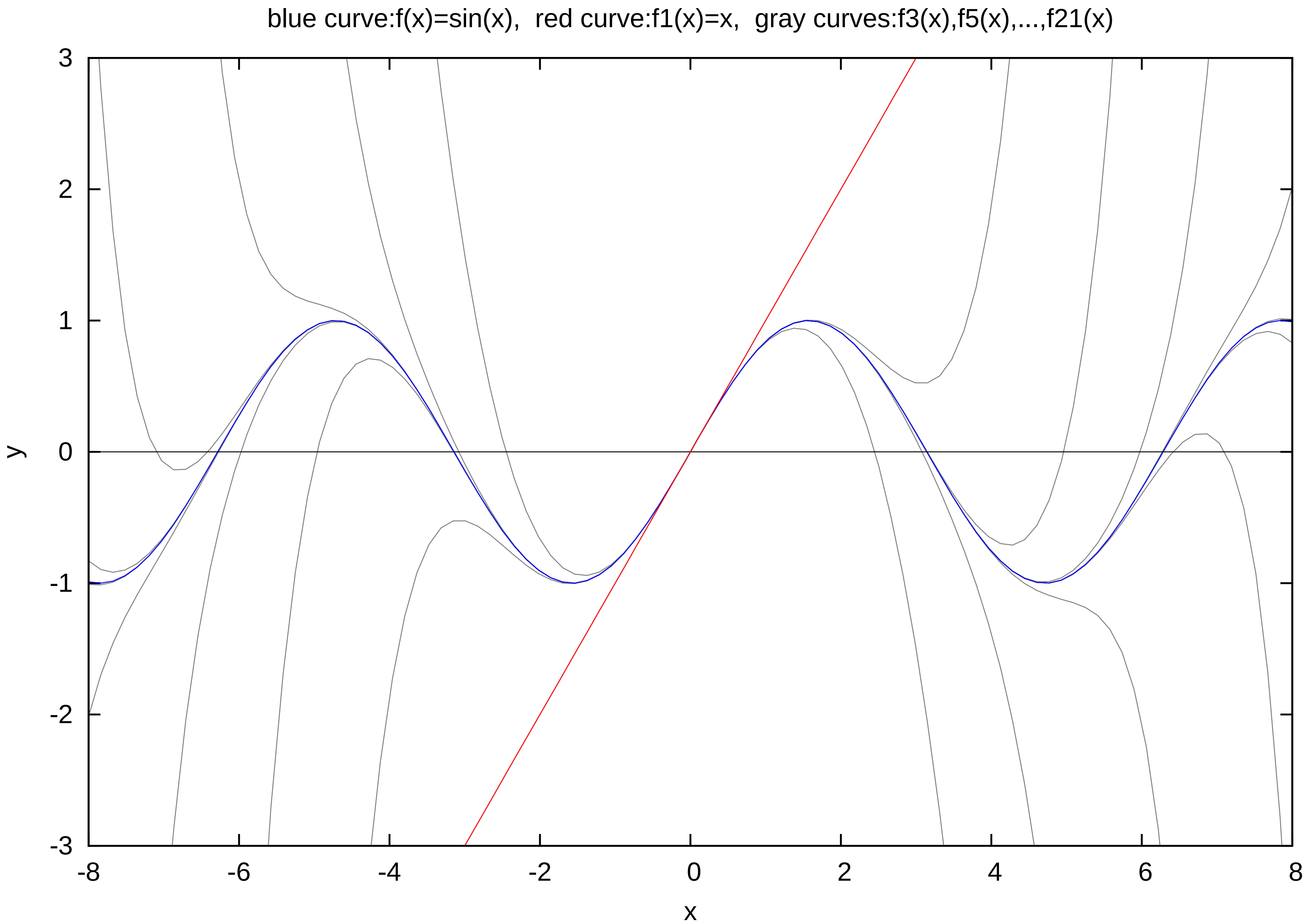
$f_9(x)=x-\frac{1}{6}x^3+\frac{1}{120}x^5-\frac{1}{5040}x^7+\frac{1}{362880}x^9$

$f_{11}(x)=x-\frac{1}{6}x^3+\frac{1}{120}x^5-\frac{1}{5040}x^7+\frac{1}{362880}x^9-\frac{1}{3991680}x^{11}$

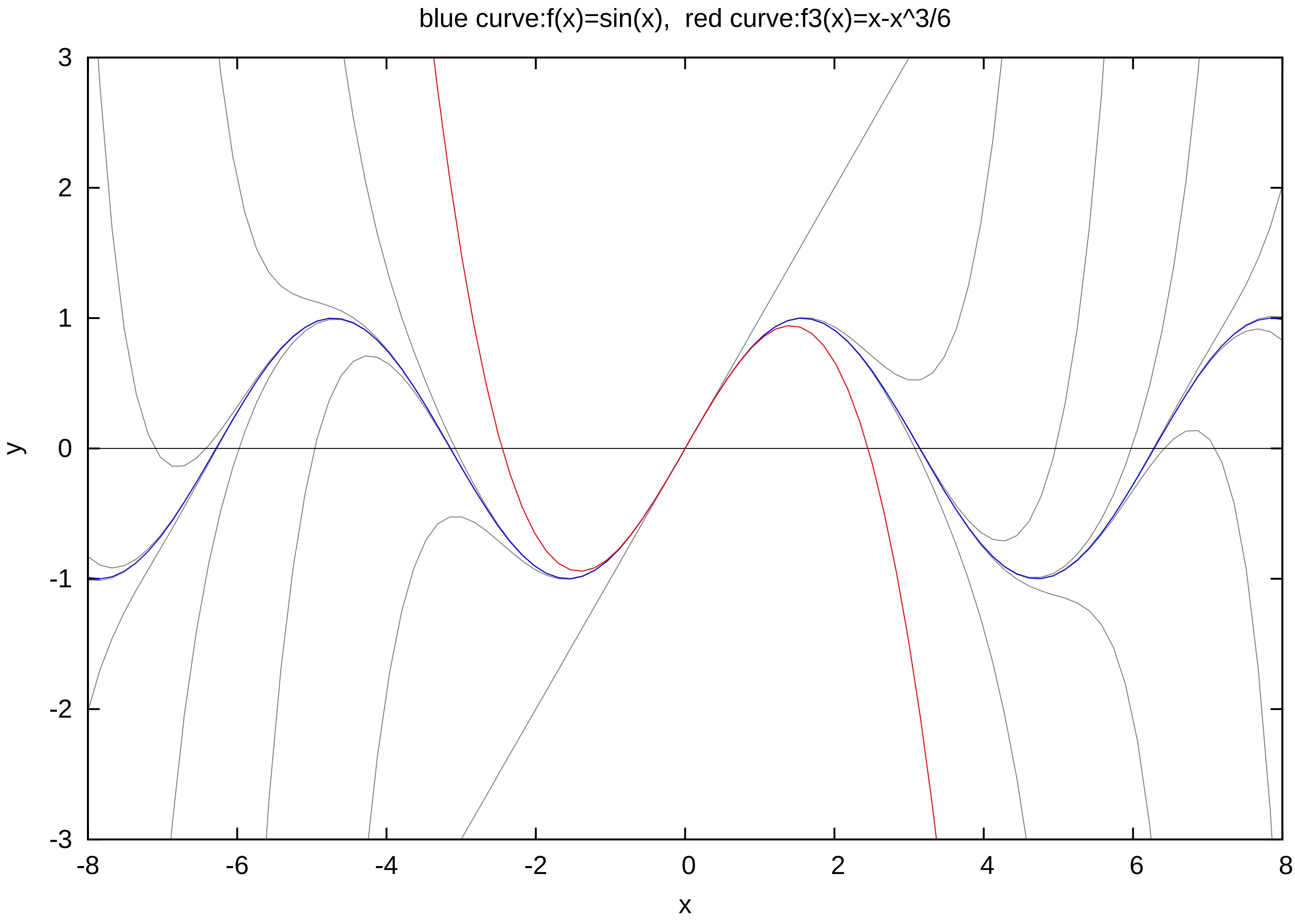
$f_{13}(x)=x-\frac{1}{6}x^3+\frac{1}{120}x^5-\frac{1}{5040}x^7+\frac{1}{362880}x^9-\frac{1}{3991680}x^{11}+\frac{1}{6227020800}x^{13}$

$\cdots$

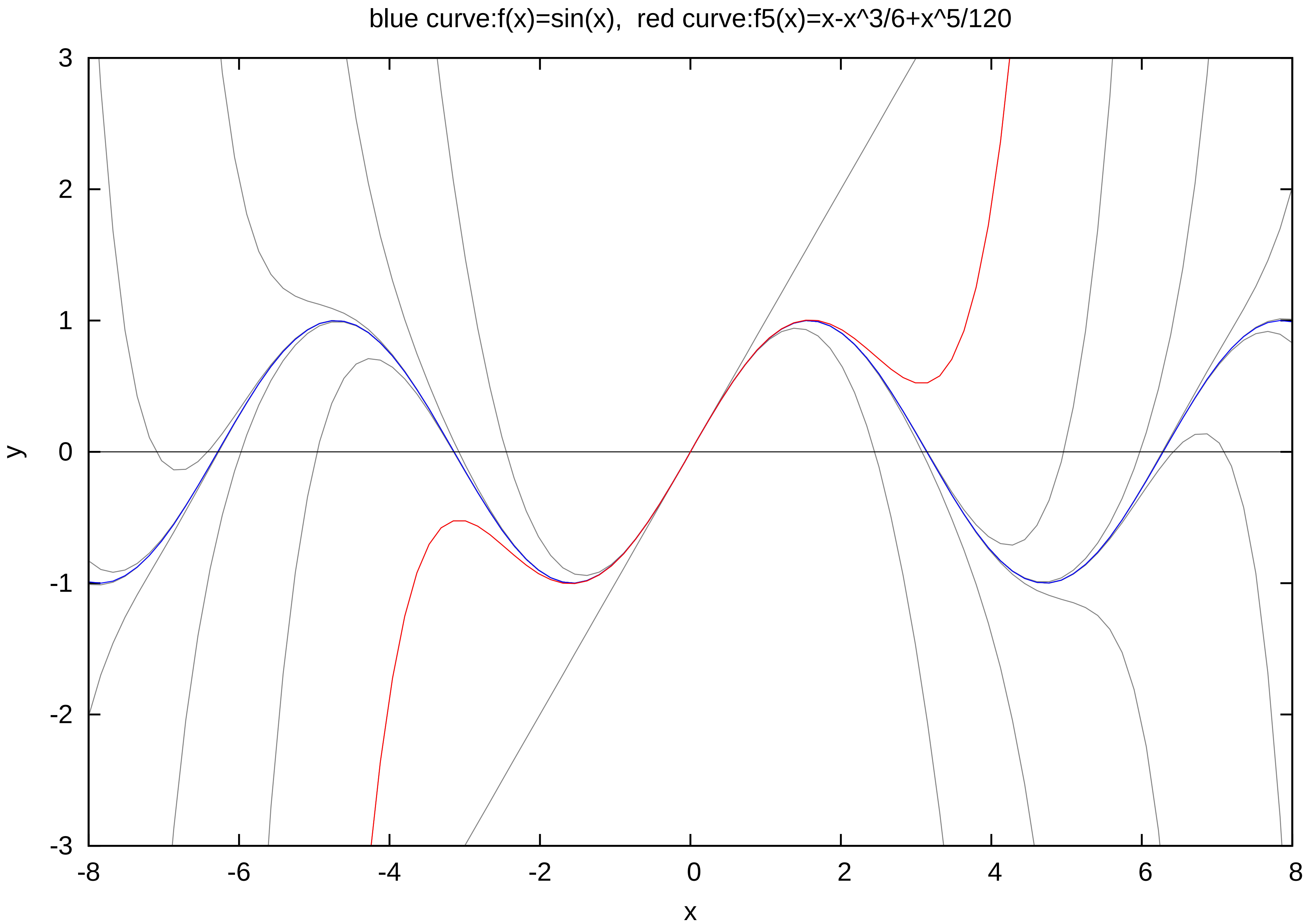
【注】$\sin\ x$ のように奇関数のテーラー展開では、x の偶数べきの項の係数はゼロとなる。したがって、$f_2(x)=f_1(x),\ f_4(x)=f_3(x),\ f_6(x)=f_5(x),\ \cdots$ である。

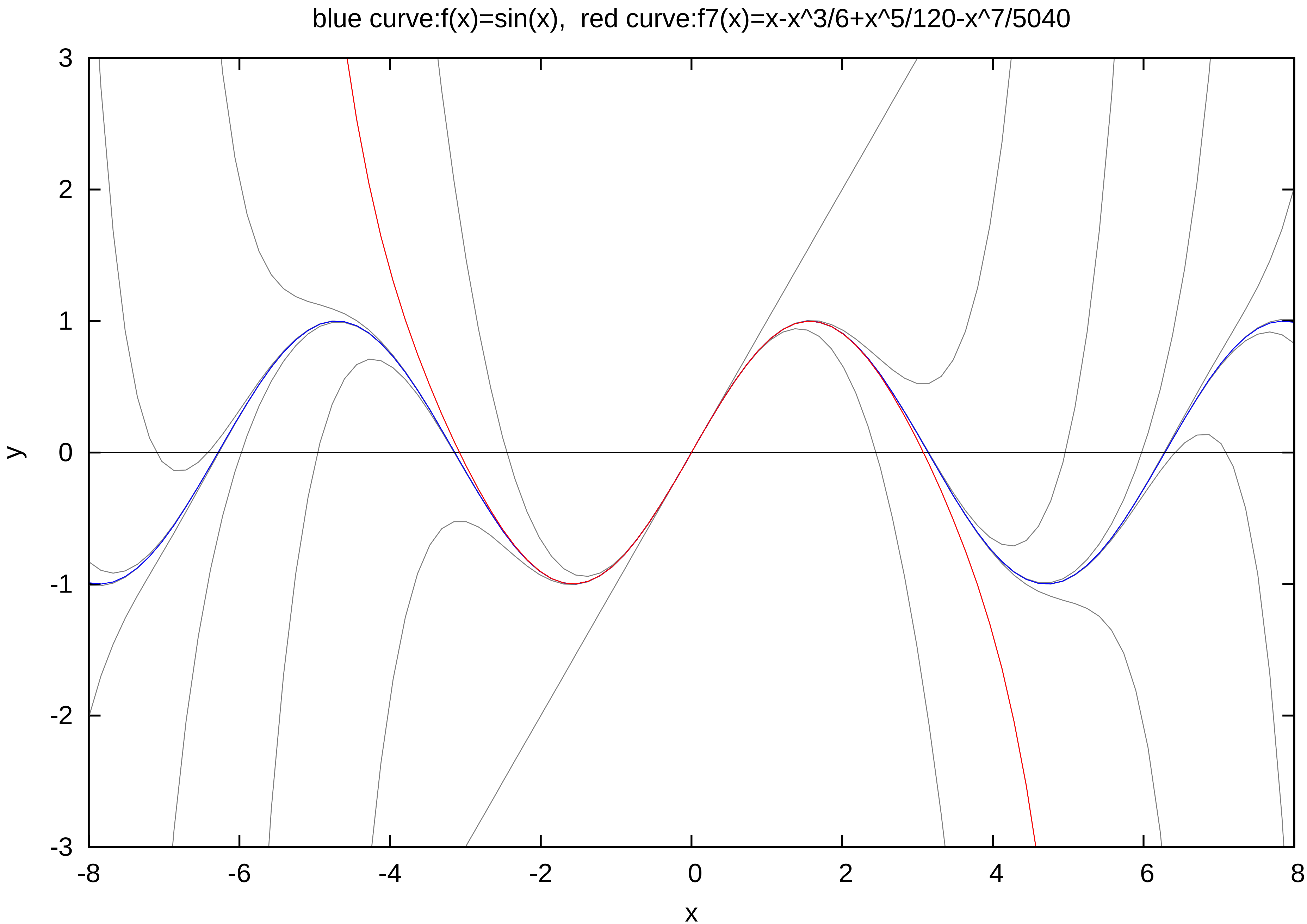


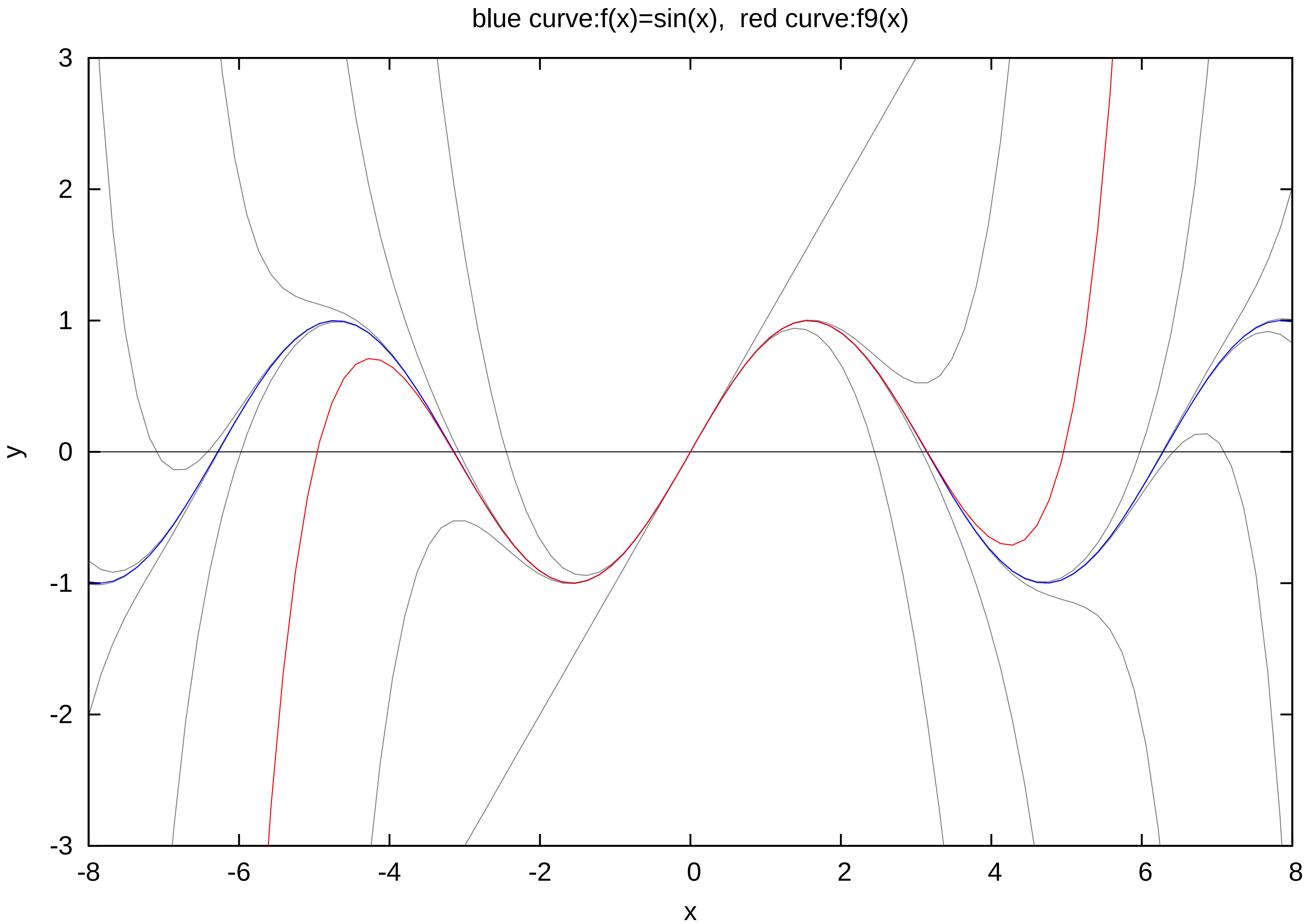
blue curve:f(x)=sin(x), red curve:f1(x)=x, gray curves:f3(x),f5(x),...,f21(x)
y
x
3
2
1
0
-1
-2
-3
-8
-6
-4
-2
0
2
4
6
8

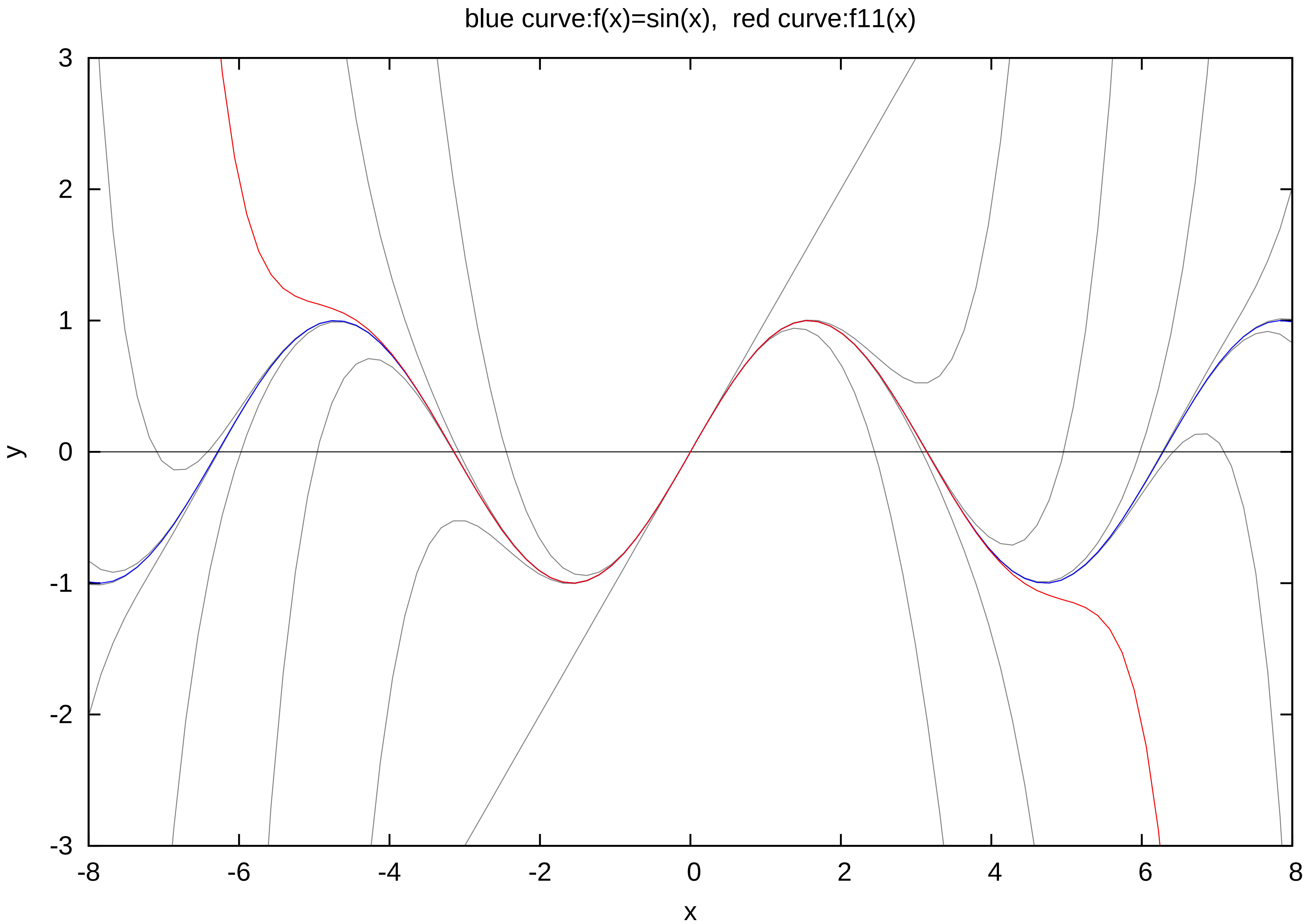


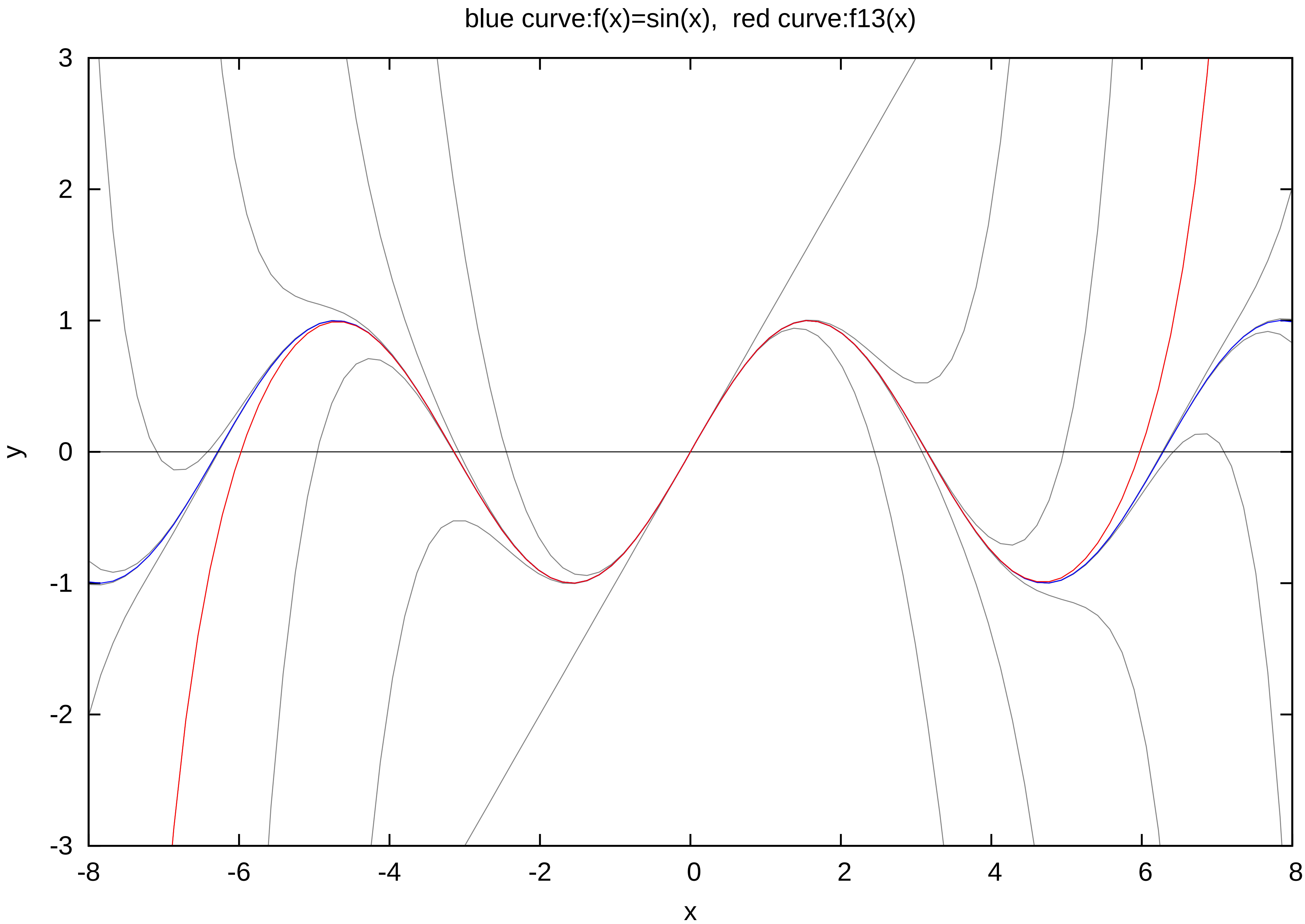
blue curve:f(x)=sin(x), red curve:f3(x)=x-x^3/6
3
2
1
0
-1
-2
-3
y
-8
-6
-4
-2
0
2
4
6
8
x

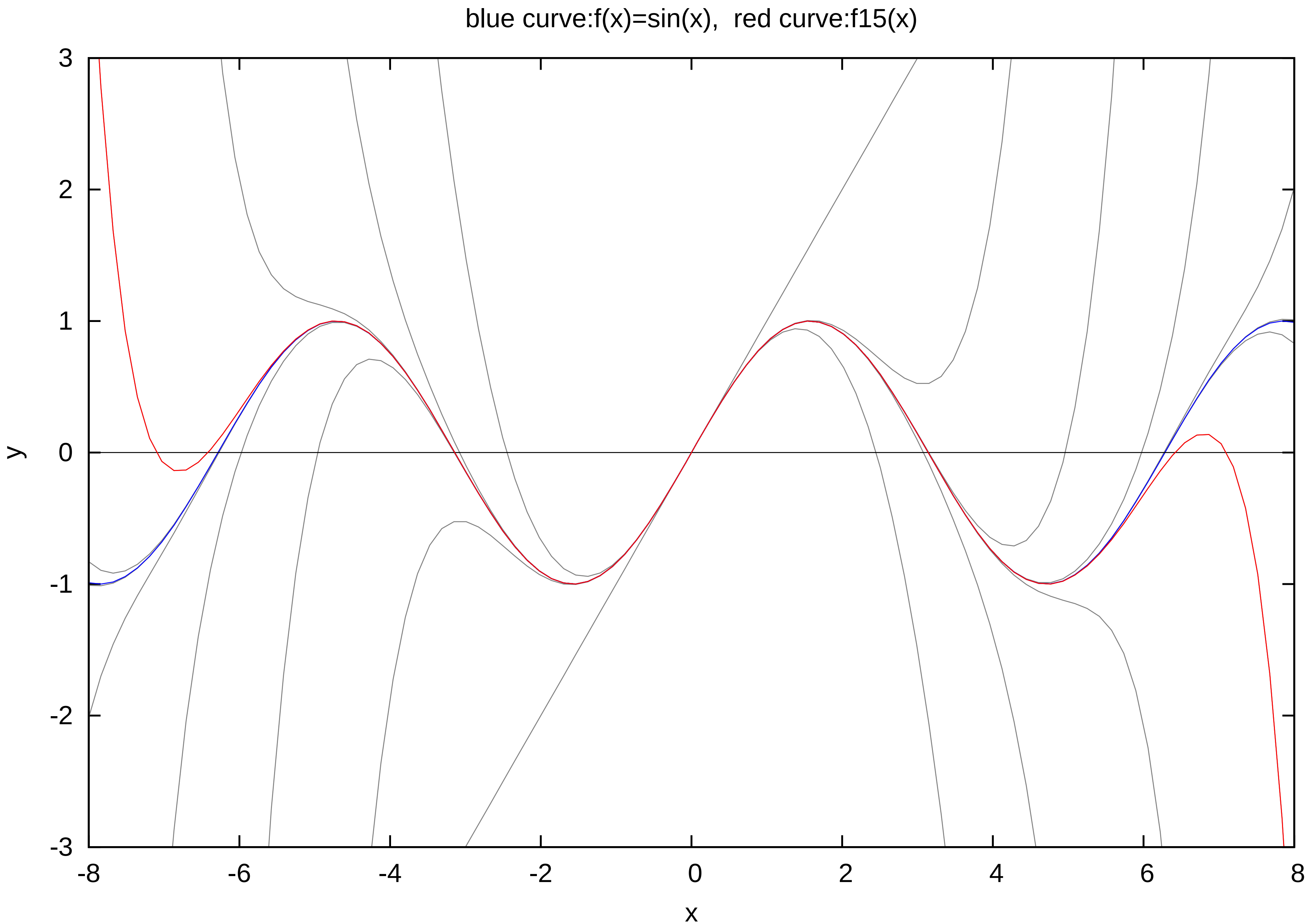

blue curve:f(x)=sin(x), red curve:f5(x)=x-x^3/6+x^5/120
y
x
3
2
1
0
-1
-2
-3
-8
-6
-4
-2
0
2
4
6
8


blue curve:f(x)=sin(x), red curve:f7(x)=x-x^3/6+x^5/120-x^7/5040
y
x
3
2
1
0
-1
-2
-3
-8
-6
-4
-2
0
2
4
6
8

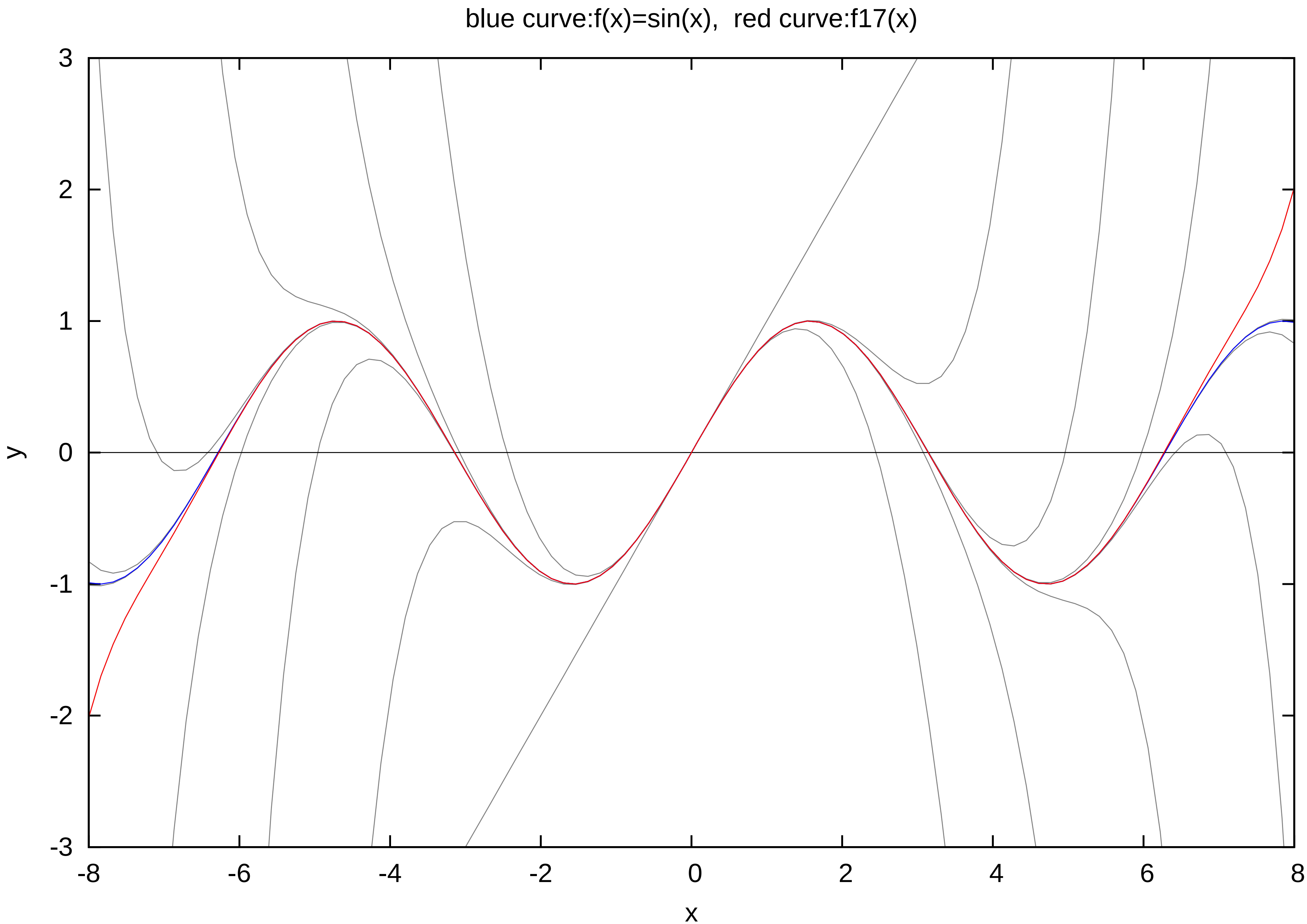

blue curve:f(x)=sin(x), red curve:f9(x)
y
x
3
2
1
0
-1
-2
-3
-8
-6
-4
-2
0
2
4
6
8


blue curve:f(x)=sin(x), red curve:f11(x)
y
x
3
2
1
0
-1
-2
-3
-8
-6
-4
-2
0
2
4
6
8

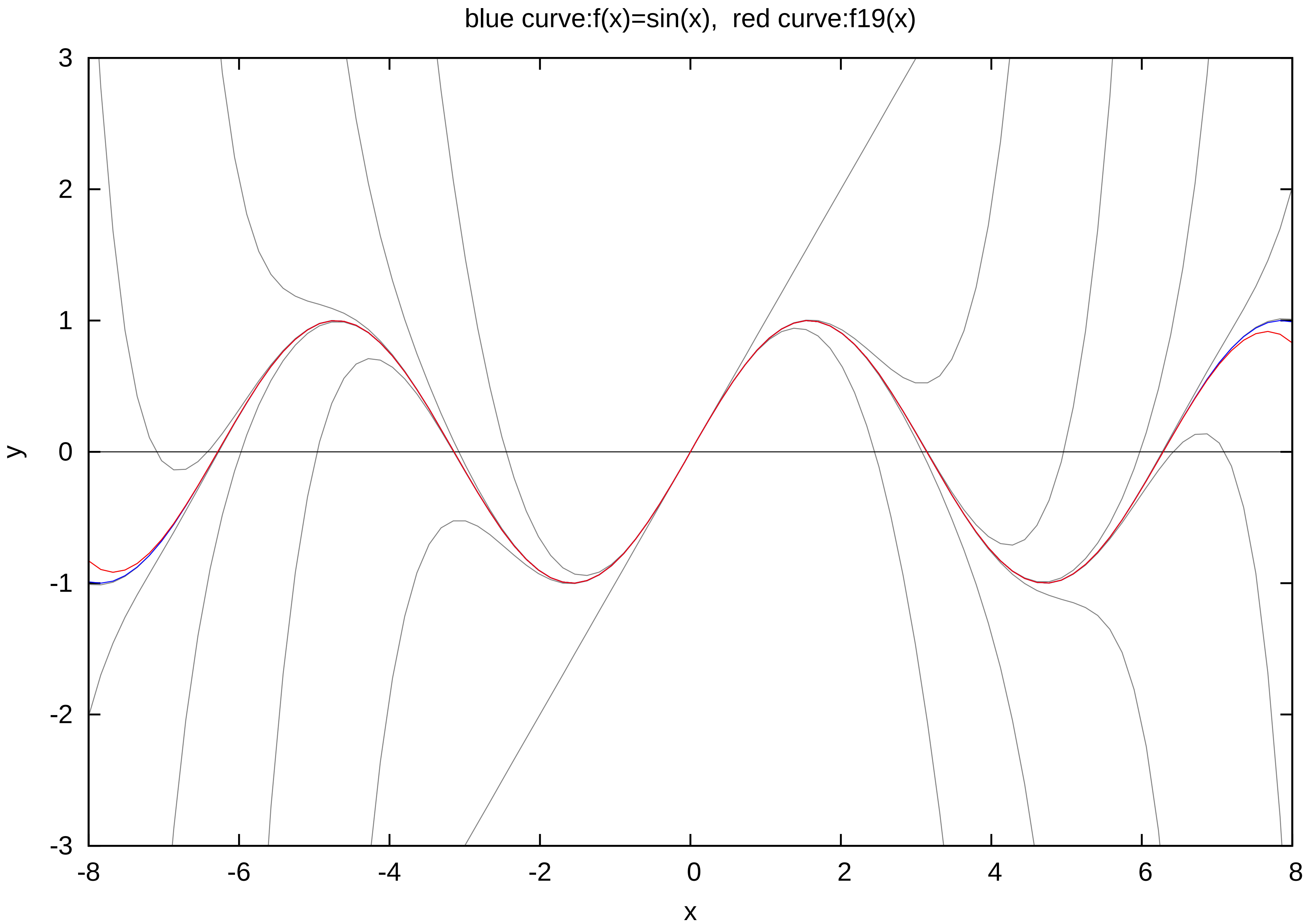

blue curve:f(x)=sin(x), red curve:f13(x)
y
x
3
2
1
0
-1
-2
-3
-8
-6
-4
-2
0
2
4
6
8



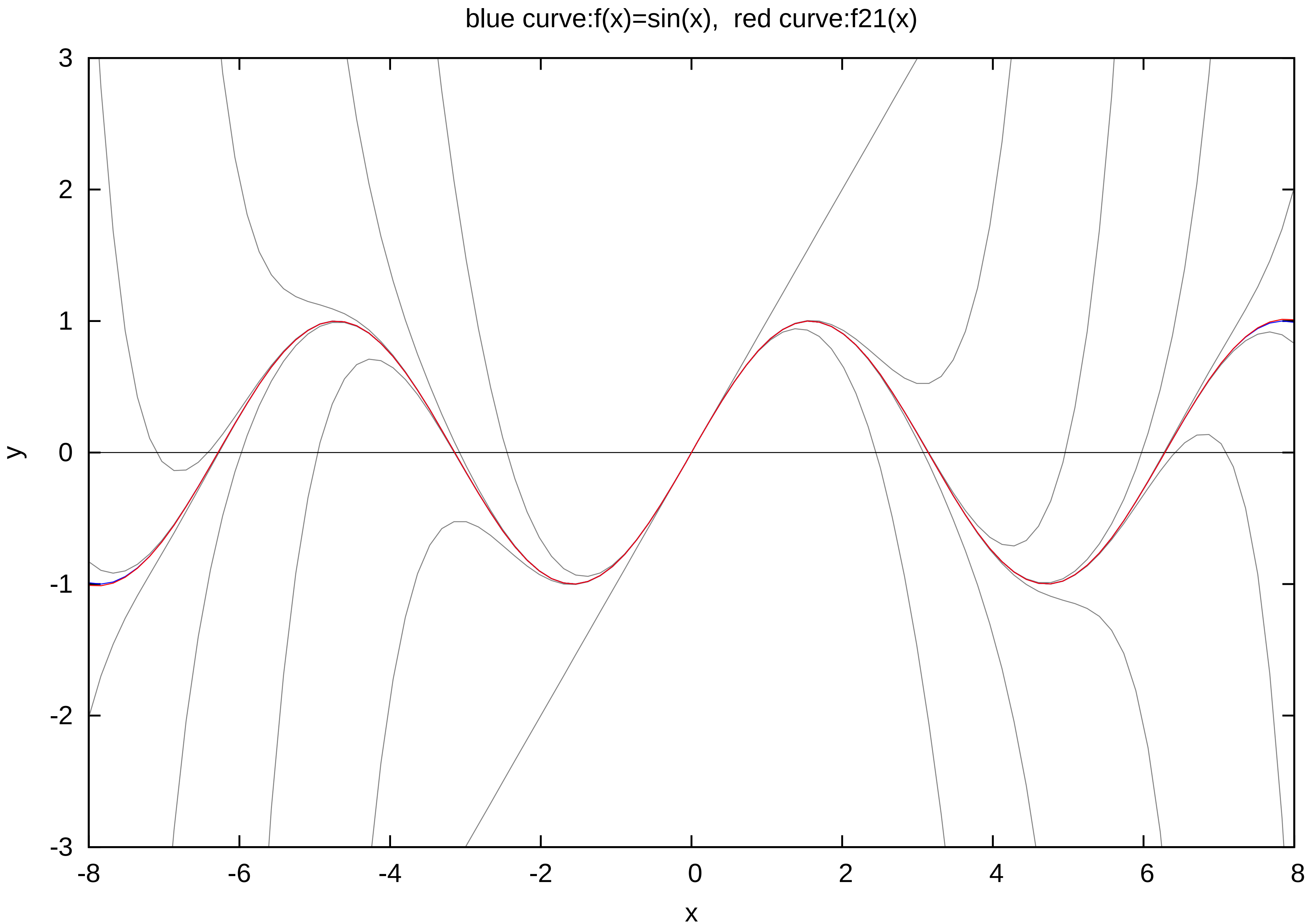
blue curve:f(x)=sin(x), red curve:f15(x)
3
2
1
0
-1
-2
-3
y
-8
-6
-4
-2
0
2
4
6
8
x



blue curve:f(x)=sin(x), red curve:f17(x)
3
2
1
0
-1
-2
-3
y
-8
-6
-4
-2
0
2
4
6
8
x



blue curve:f(x)=sin(x), red curve:f19(x)
y
3
2
1
0
-1
-2
-3
-8
-6
-4
-2
0
2
4
6
8
x



blue curve:f(x)=sin(x), red curve:f21(x)
y
x
3
2
1
0
-1
-2
-3
-8
-6
-4
-2
0
2
4
6
8