First worksheet @ ICERM

```
3 + 2
```

```
5
```

This is my first equation:

$$\int_a^b e^x\,dx$$

```

```

```
4 + 5
```

```
9
```

```

```

```
x^2 + 4 - 3*x
```

```
x^2 - 3*x + 4
```

```

```

```
search_doc("Young")
```

```
Traceback (click to the left of this block for traceback)
...
__SAGE__
```

```
Partitions
```

```
<function Partitions at 0x3634488>
```

```
P = Partitions(15)
```

```

```

```
P
```

```
Partitions of the integer 15
```

```
P.cardinality()
```

```
176
```

```
P.an_element()
```

```
[14, 1]
```

```
P.random_element()
```

```
[6, 2, 2, 1, 1, 1, 1, 1]
```

```
P.list()
```

```
[[15], [14, 1], [13, 2], [13, 1, 1], [12, 3], [12, 2, 1], [12, 1, 1,
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[1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1]]

```
P = Partitions(429)
```

```
P.cardinality()
```

```
39020148000237259665
```

```
P.first()
```

```
[429]
```

```
for p in P:
    print p
```

```
WARNING: Output truncated!
full_output.txt
```

```
[429]
[428, 1]
[427, 2]
[427, 1, 1]
[426, 3]
[426, 2, 1]
[426, 1, 1, 1]
[425, 4]
[425, 3, 1]
[425, 2, 2]
[425, 2, 1, 1]
[425, 1, 1, 1, 1]
[424, 5]
[424, 4, 1]
[424, 3, 2]
[424, 3, 1, 1]
[424, 2, 2, 1]
[424, 2, 1, 1, 1]
[424, 1, 1, 1, 1, 1]
[423, 6]
[423, 5, 1]
[423, 4, 2]
[423, 4, 1, 1]
[423, 3, 3]
[423, 3, 2, 1]
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[423, 2, 2, 1, 1]
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[422, 7]
[422, 6, 1]
[422, 5, 2]
[422, 5, 1, 1]
[422, 4, 3]
[422, 4, 2, 1]
```

```
[422, 4, 1, 1, 1]
[422, 3, 3, 1]
[422, 3, 2, 2]
[422, 3, 2, 1, 1]
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[421, 8]
[421, 7, 1]
[421, 6, 2]
[421, 6, 1, 1]
[421, 5, 3]
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...

[395, 14, 5, 5, 4, 2, 2, 2]
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```

```
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[395, 14, 5, 4, 2, 1, 1, 1, 1, 1, 1, 1, 1, 1]
[395, 14, 5, 4, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1]
[395, 14, 5, 3, 3, 3, 3, 3]
[395, 14, 5, 3, 3, 3, 3, 2, 1]
^C
Traceback (click to the left of this block for traceback)
...
__SAGE__
```

full_output.txt

```
p
```

```
[395, 14, 5, 3, 3, 3, 3, 2, 1]
```

```
p = Partition([5,3,1,1])
```

```
p
```

```
[5, 3, 1, 1]
```

```
print p.ferrers_diagram()
```

```
*****
***
*
*
```

```
S = p.standard_tableaux()
```

```
S
```

```
Standard tableaux of shape [5, 3, 1, 1]
```

```
t = S.first()
```

```
t.pp()
```

```
     1  5  7  9 10
     2  6  8
     3
     4
```

```
latex(t)
```

```
    {\def\lr#1{\multicolumn{1}{|@{\hspace{.6ex}}c@{\hspace{.6ex}}|}{\rai\
    sebox{-.3ex}{$#1$}}}
    \raisebox{-.6ex}{$\begin{array}[b]{ccccc}
    \cline{1-1}\cline{2-2}\cline{3-3}\cline{4-4}\cline{5-5}
    \lr{1}&\lr{5}&\lr{7}&\lr{9}&\lr{10}\\
    \cline{1-1}\cline{2-2}\cline{3-3}\cline{4-4}\cline{5-5}
    \lr{2}&\lr{6}&\lr{8}\\
    \cline{1-1}\cline{2-2}\cline{3-3}
    \lr{3}\\
    \cline{1-1}
    \lr{4}\\
    \cline{1-1}
    \end{array}$}
    }
```

```
view(t, pdflatex=True, viewer='pdf')
```

```

```

```
f(x) = x^2 + sin(4*x)
```

```
f(x)
```

```
    x^2 + sin(4*x)
```

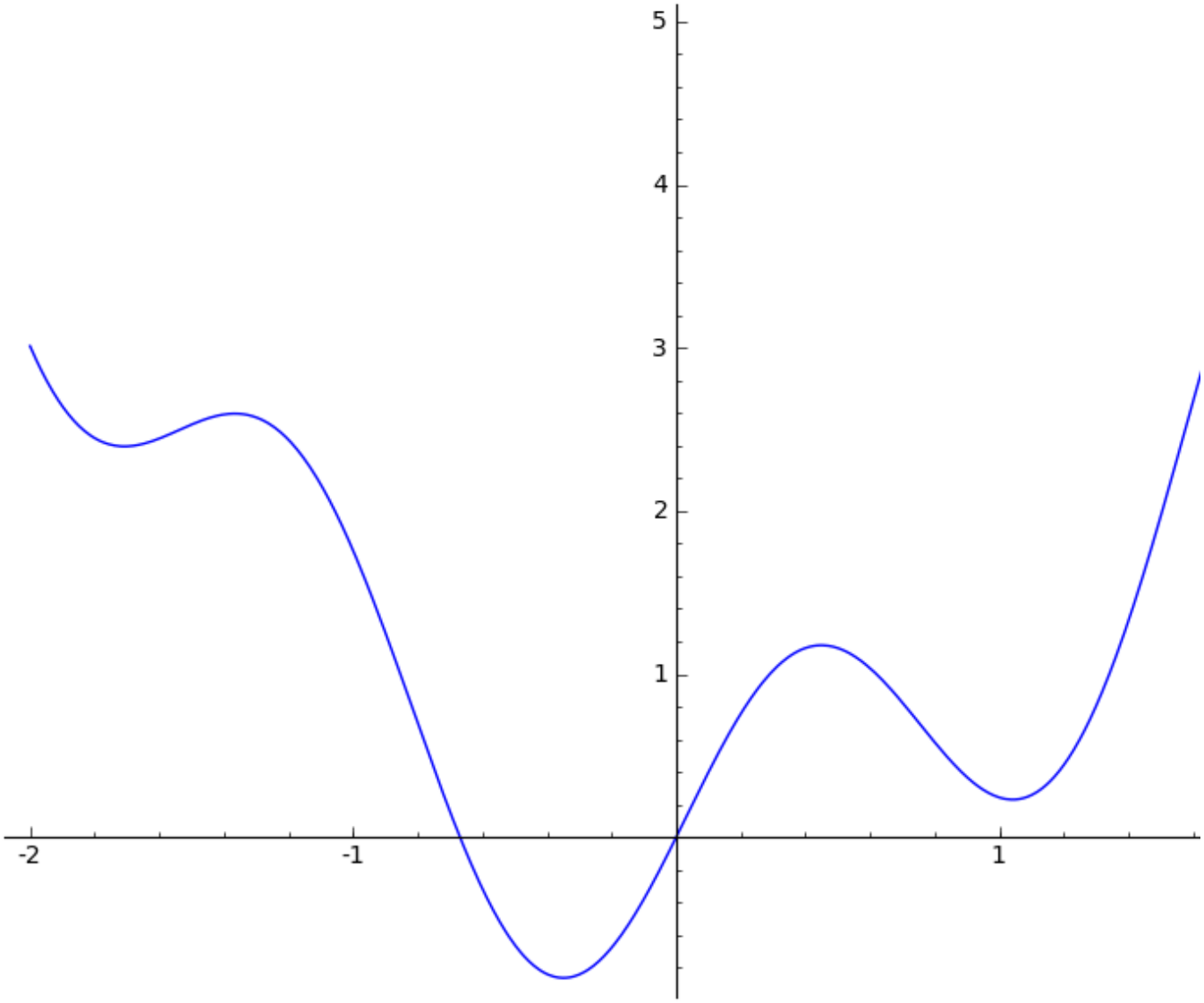
```
show(f(x))
```

$$x^2 + \sin(4\,x)$$

```
f(-3)
```

```
    -sin(12) + 9
```

```
plot(f(x), -2, 2)
```




```
type(f(x))
```

```
<type 'sage.symbolic.expression.Expression'>
```

```
f(t)
```

```
Traceback (click to the left of this block for traceback)
...
TypeError: no canonical coercion from Standard tableaux of shape [5, 3, 1, 1] to Callable function ring with arguments (x,)
```

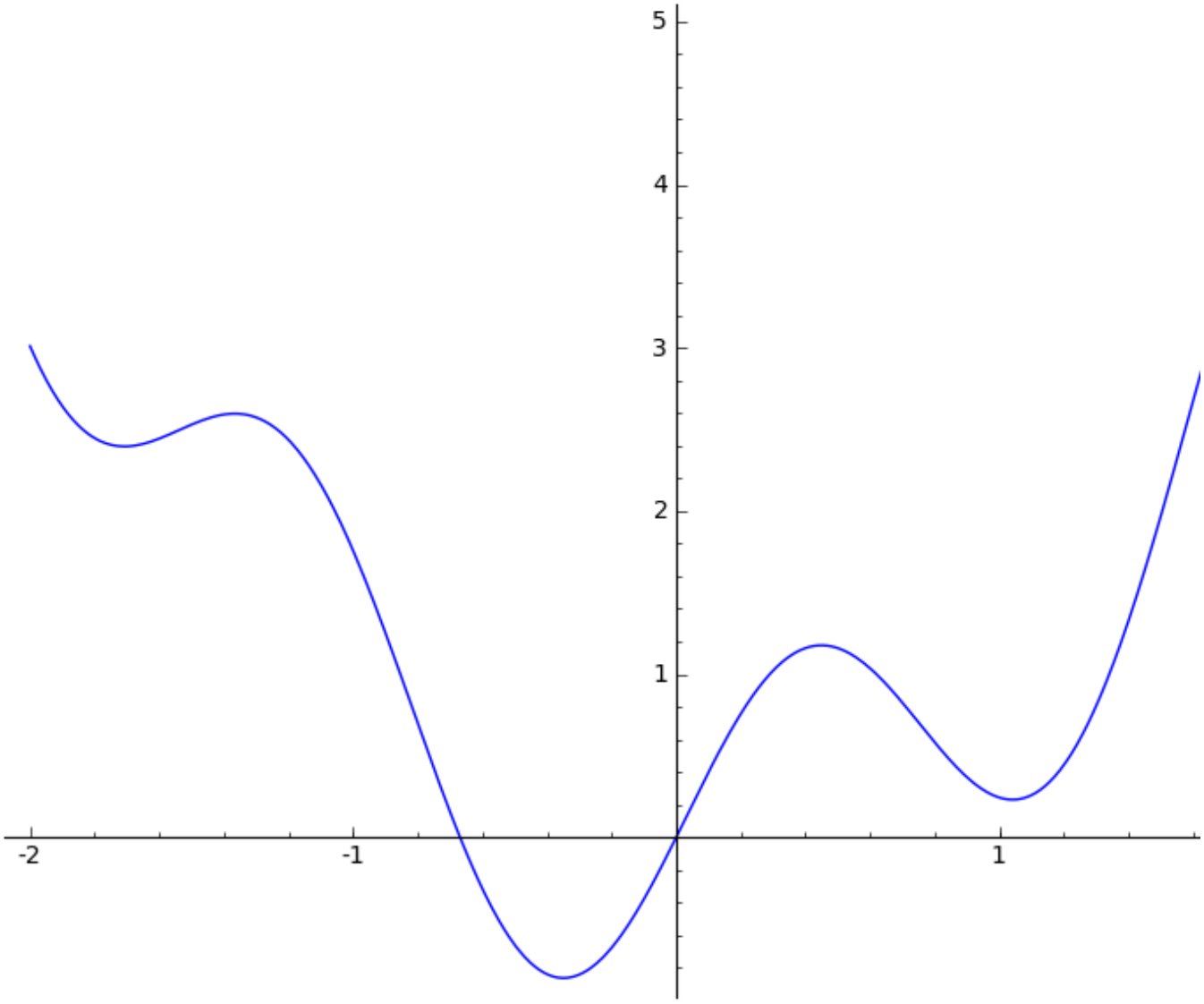
```
t
```

```
[[1, 5, 7, 9, 10], [2, 6, 8], [3], [4]]
```

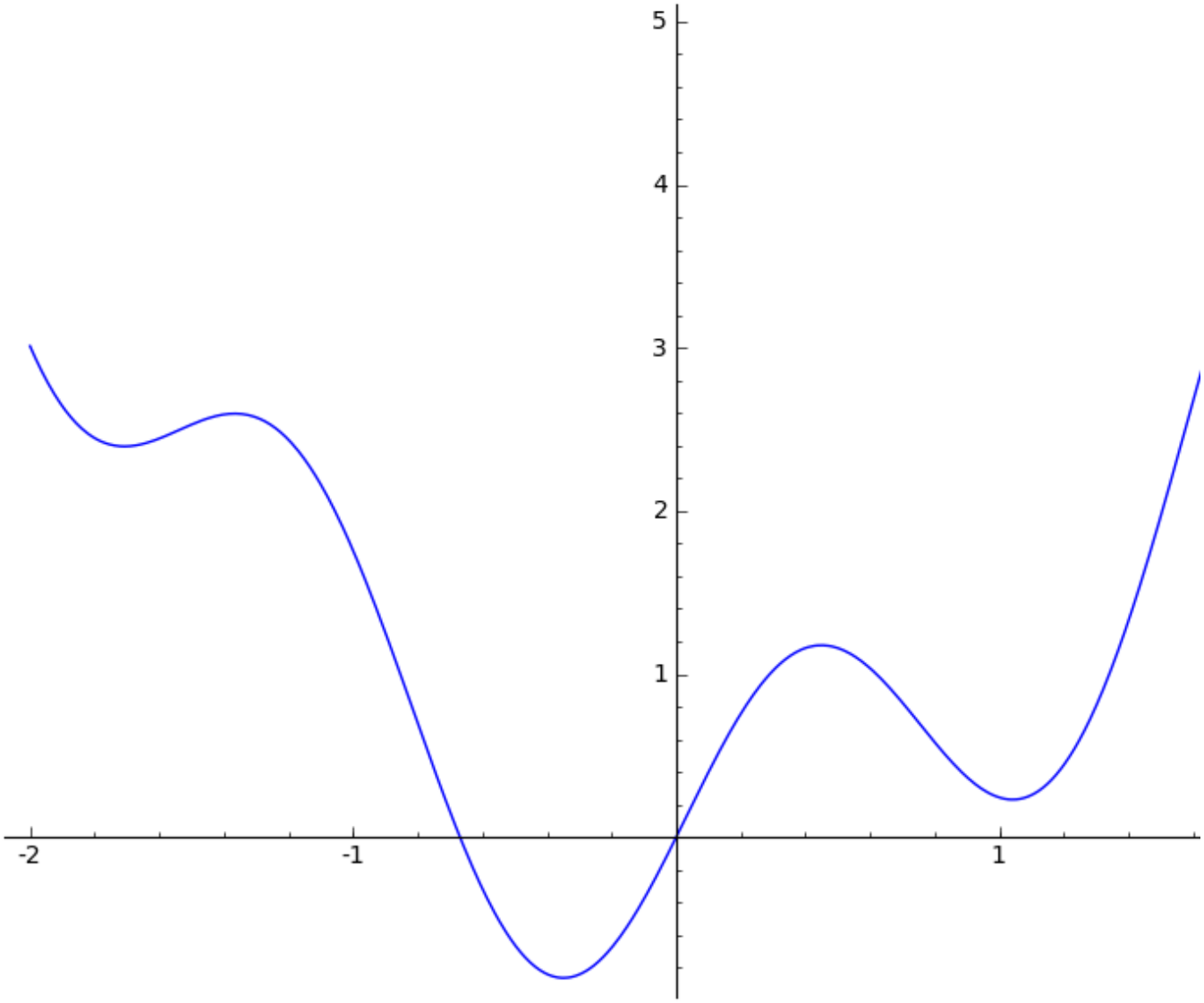
```
var('t')
```

```
t
```

```
plot(f(t), -2, 2)
```




```
plot(f, -2, 2)
```




```
type(f)
```

```
<type 'sage.symbolic.expression.Expression'>
```

```
f.taylor()
```

```
Traceback (click to the left of this block for traceback)
...
NotImplementedError: Wrong arguments passed to taylor. See taylor?
for more details.
```

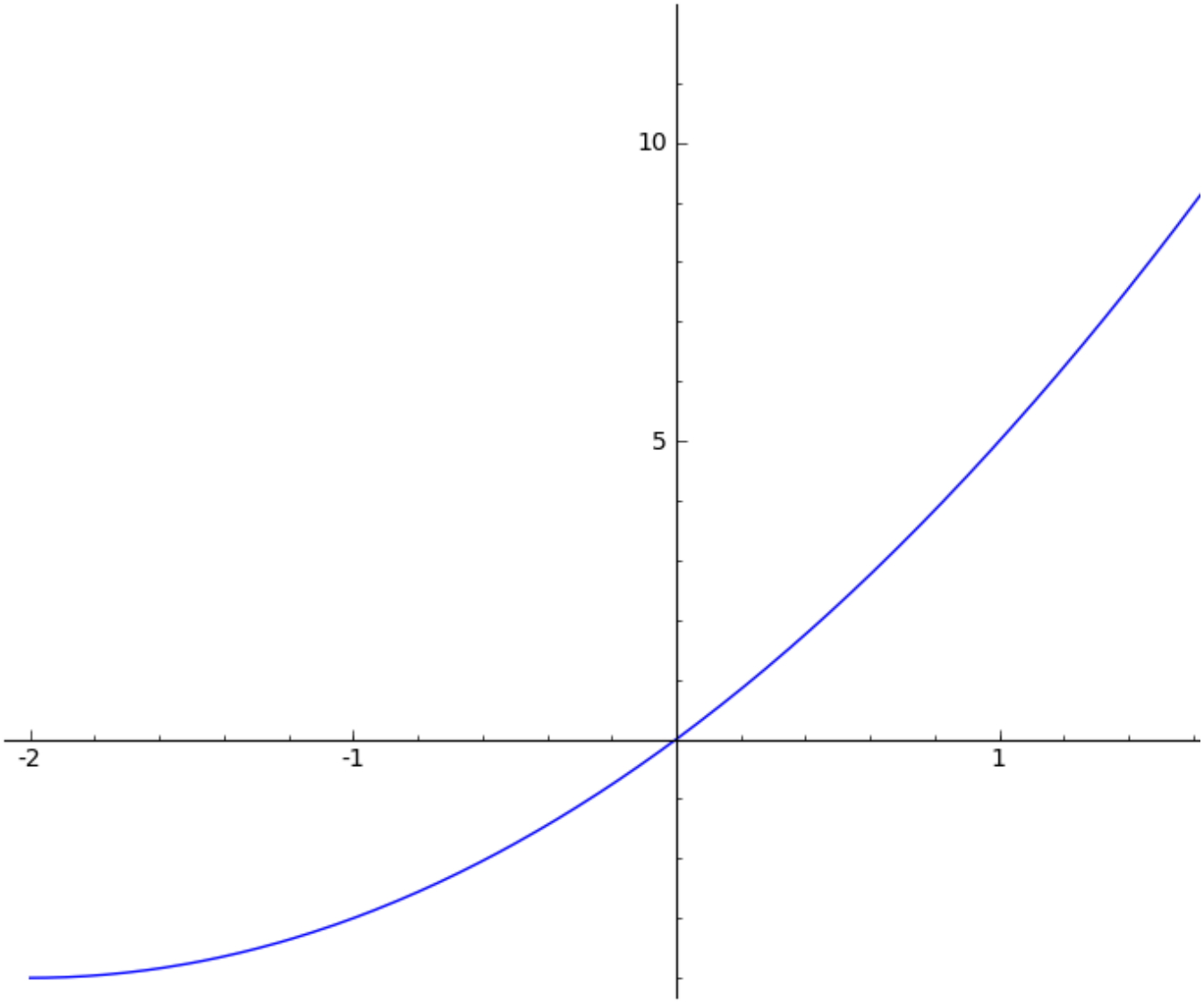
```
f.taylor(x, 0, 2)
```

```
x |--> x^2 + 4*x
```

```
show(f.taylor(x, 0, 2))
```

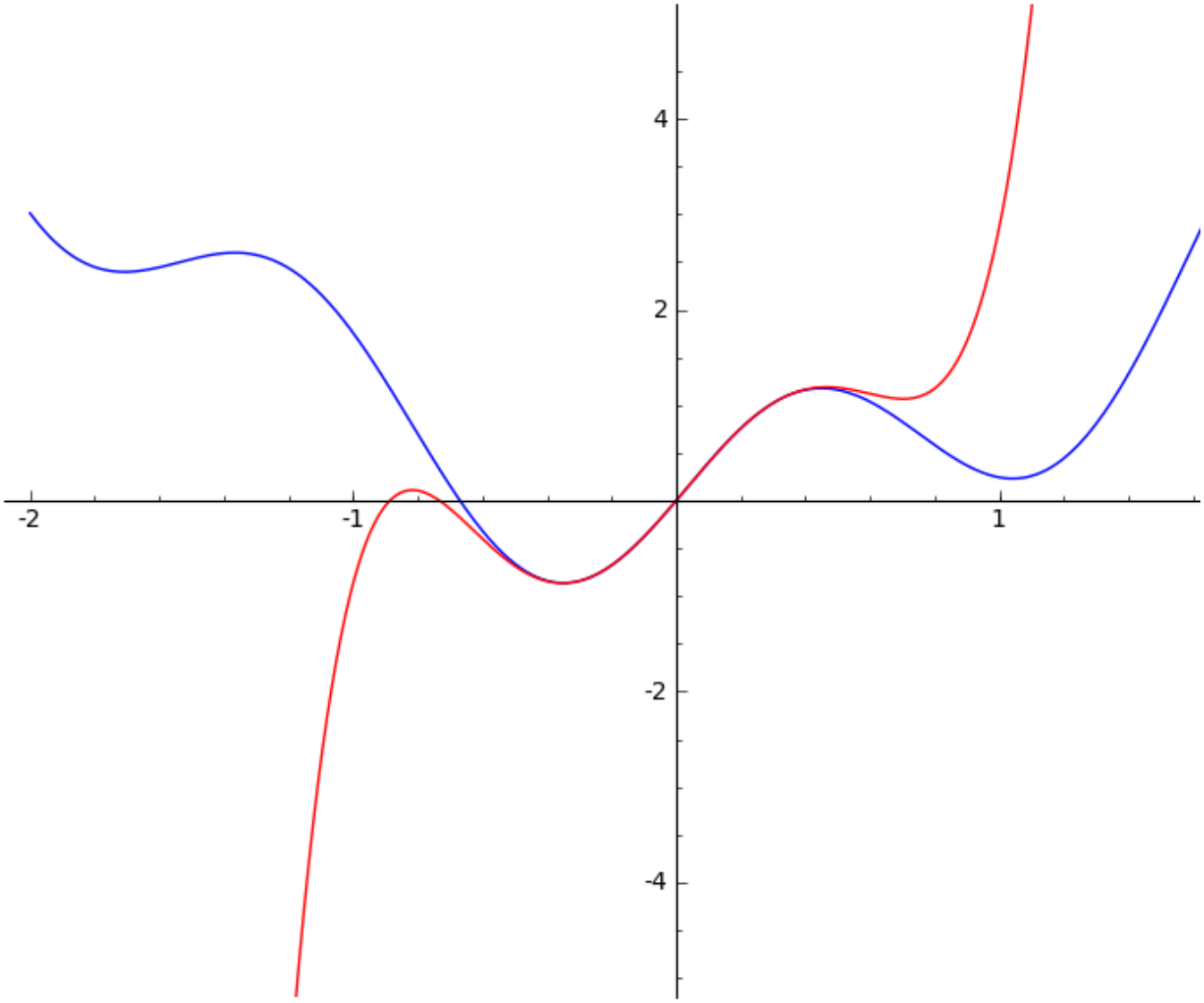
$$x \mapsto x^2 + 4\,x$$

```
plot(f.taylor(x, 0, 2), -2, 2)
```

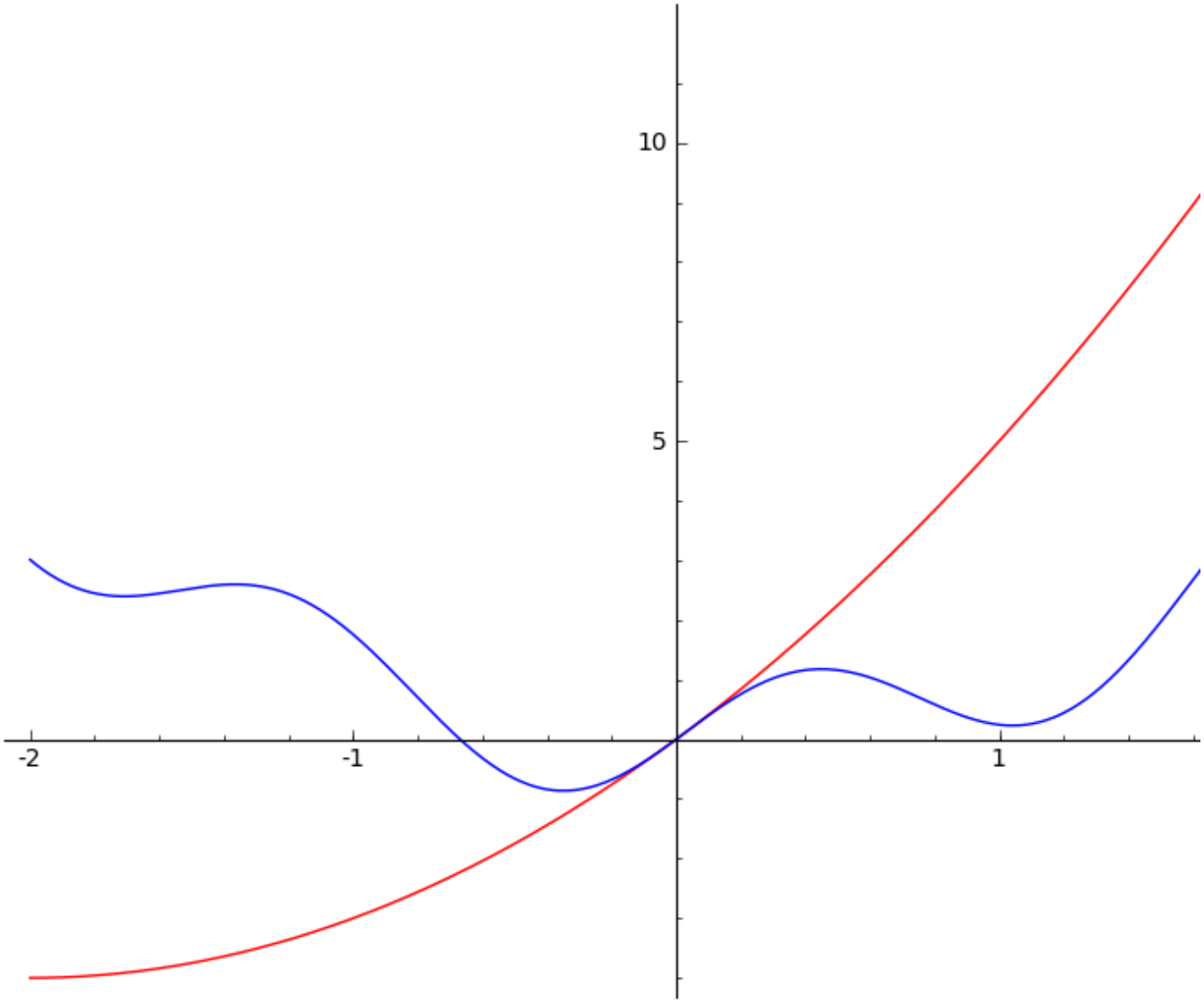



```
P1 = plot(f, -2, 2)
P2 = plot(f.taylor(x, 0, 5), -2, 2, color='red', ymin=-5, ymax=5)
```

```
P1 + P2
```



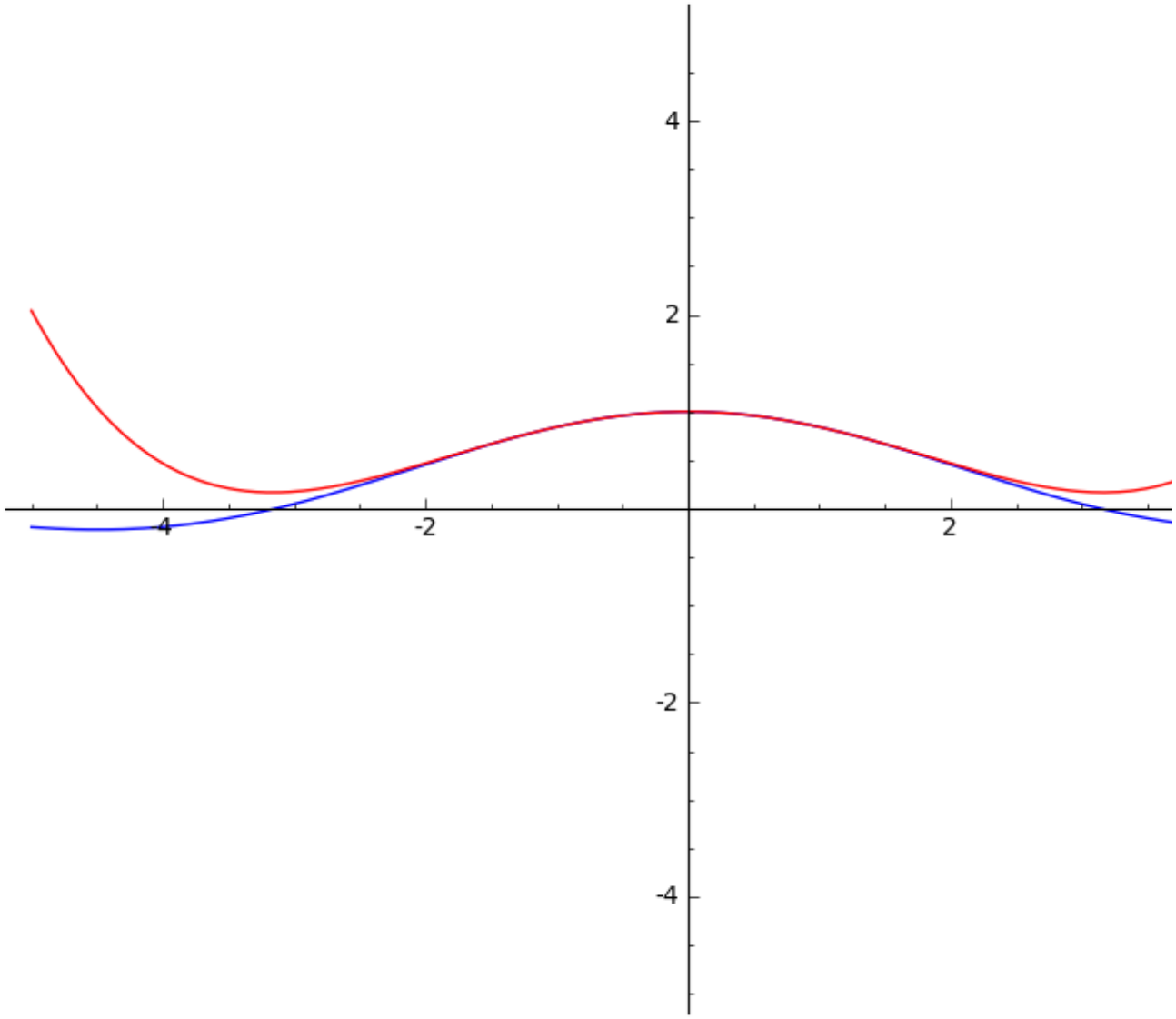

```
P2 + P1
```



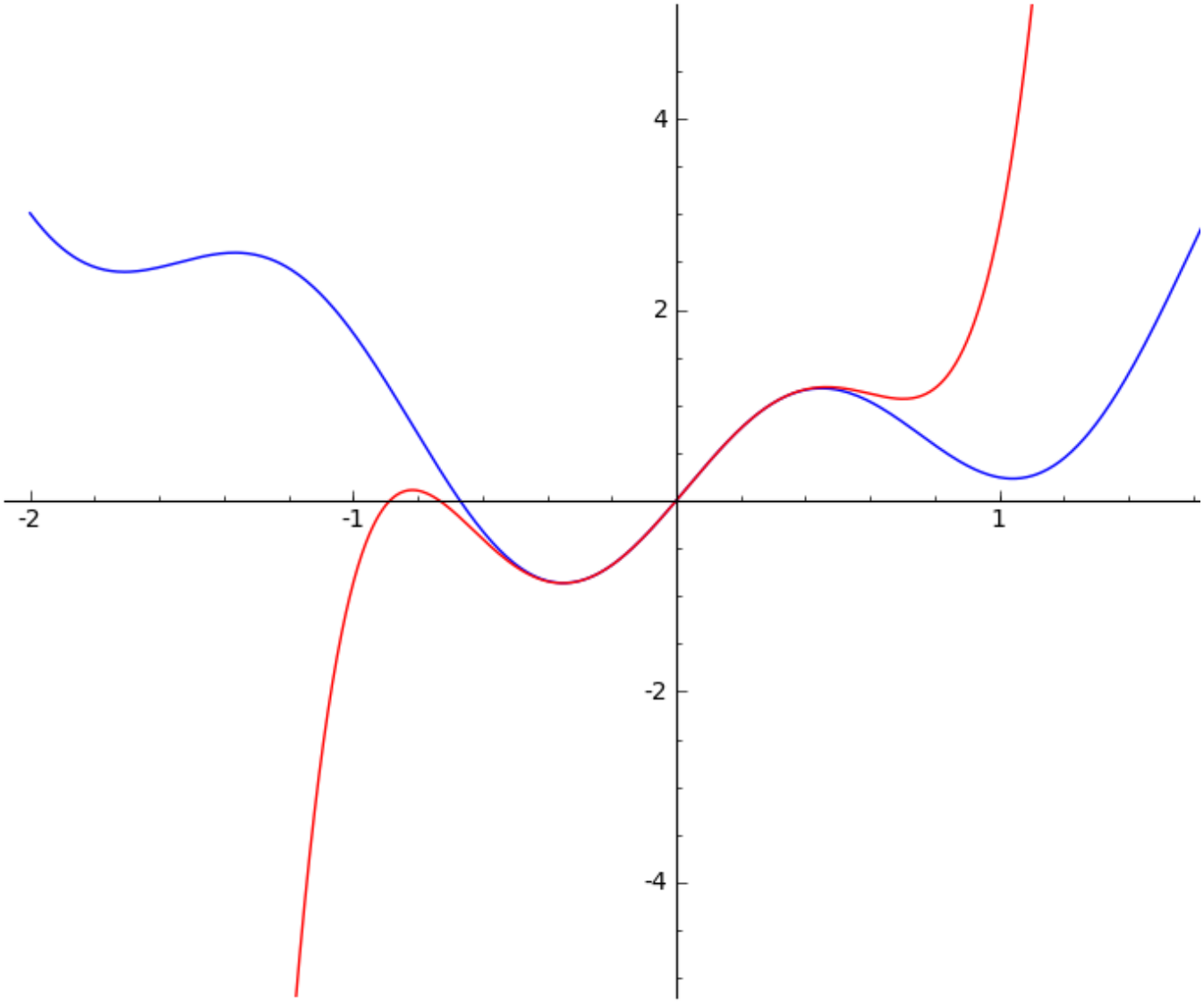

```
@interact
def taylor_play(f=x^2+sin(4*x), order=slider(0, 20, 1, 2)):
    P1 = plot(f, -5, 5)
    P2 = plot(f.taylor(x, 0, order), -5, 5, color='red', ymin=-5,
ymax=5)
    show(P1 + P2)
```

f x^2 + sin(4*x)

order 2




```
taylor_play(5)
```



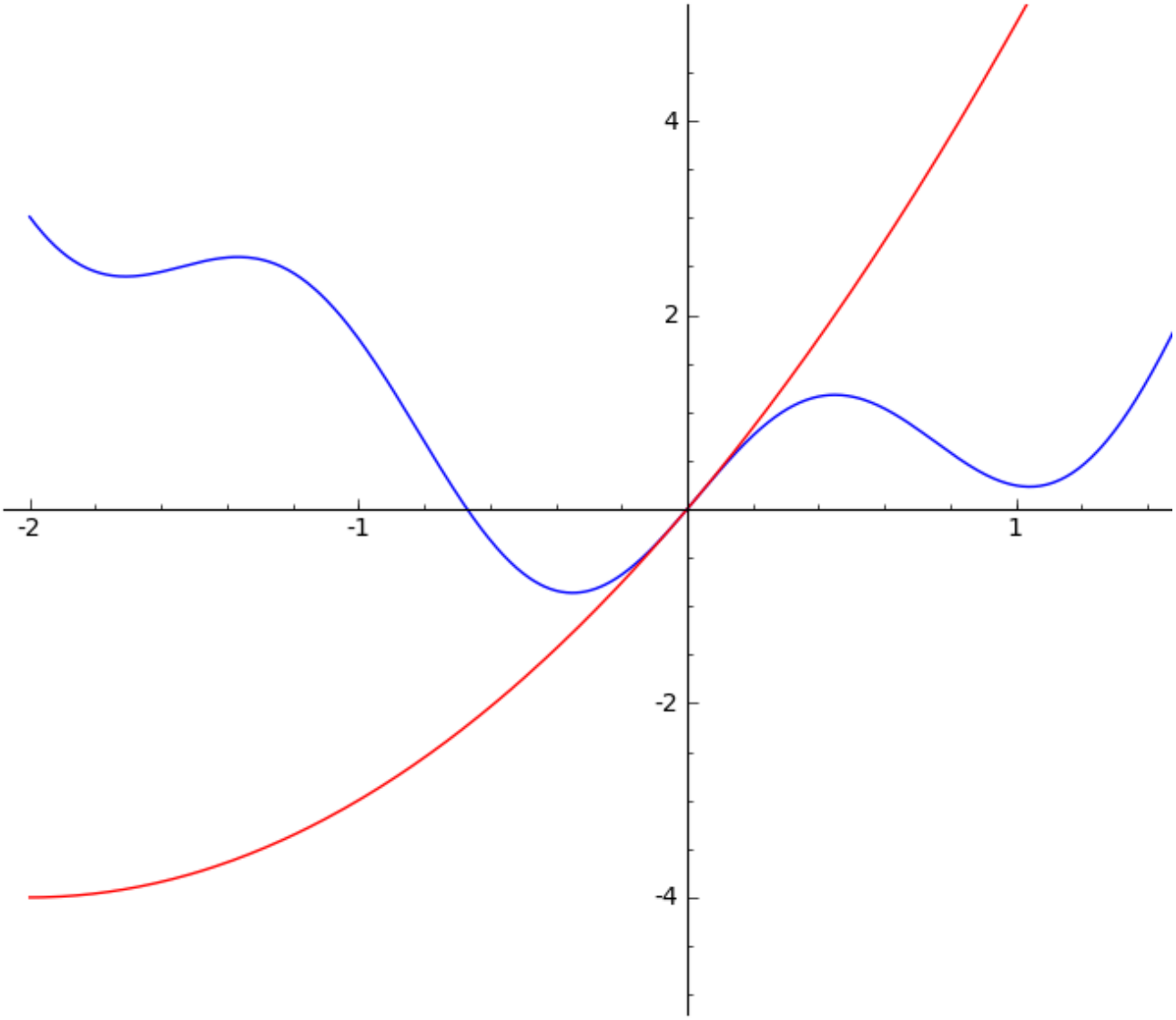

```
@interact
def
taylor_play(f=x^2+sin(4*x),order=slider(0,20,1,2),x0=slider(-2,2,.25,0)):

    p1 = plot(f, -2, 2, ymin=-5,ymax=5)
    p2 = plot(f.taylor(x, x0, order),-2,2,color='red',ymin=-5,ymax=5)
    show(p1 + p2)
```

f x^2 + sin(4*x)

order 2

x0 0.000000000000000


4
2
-2
-4
-2
-1
1