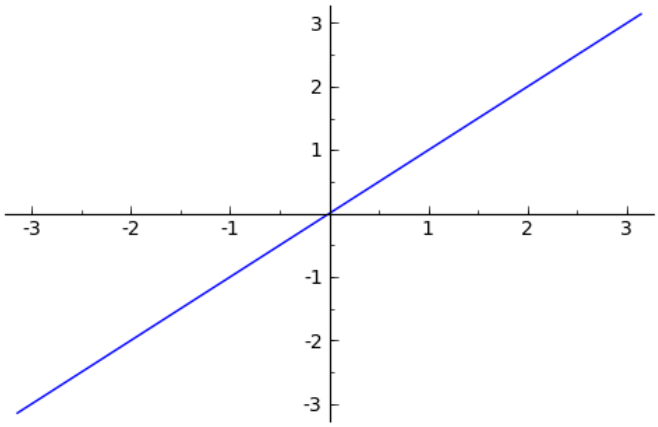
Fourier

```
x=var('x')
```

```
f=x
```

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




```
def an(f,n):
    return integrate(f*cos(n*x),x,-pi,pi)/integrate(cos(n*x)*cos(n*x),x,-pi,pi)
def bn(f,n):
    return integrate(f*sin(n*x),x,-pi,pi)/integrate(sin(n*x)*sin(n*x),x,-pi,pi)
```

```
an(f,2)
```

```
    0
```

```
bn(f,1)
```

```
    2
```

```
bn(f,2)
```

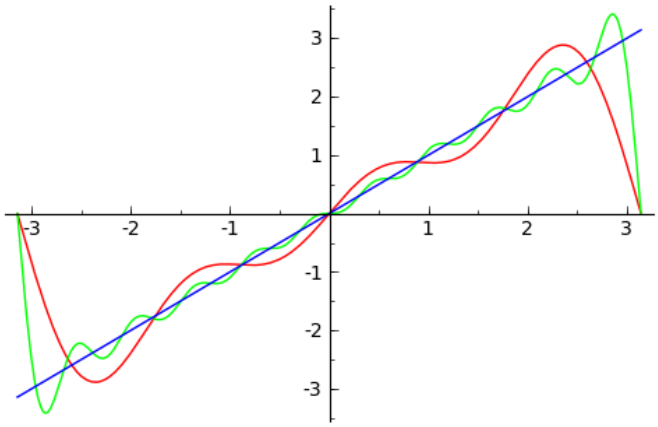
```
    -1
```

```
def fourier(f,nmax):
    return add([an(f,n)*cos(n*x) for n in range(0,nmax+1)])+add([bn(f,n)*sin(n*x) for n in
range(1,nmax+1)])
```

```
fourier(f,3)
```

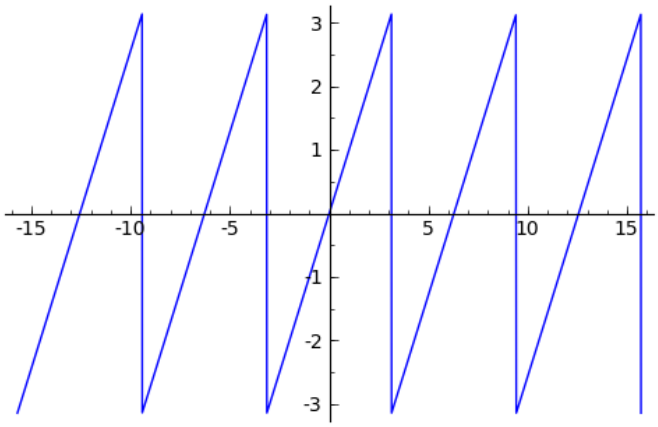
```
    -sin(2*x) + 2/3*sin(3*x) + 2*sin(x)
```

```
plot(fourier(f,3),x,-pi,pi,color='red')+plot(fourier(f,10),x,-pi,pi,color='green')+plot(f,x,-pi,pi)
```

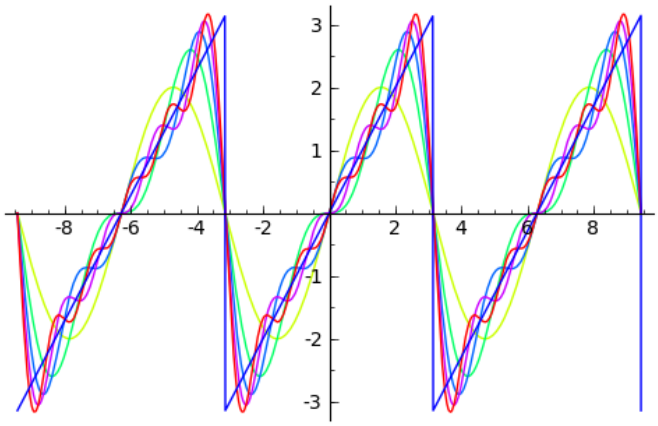



```
fp=x-floor((x+pi)/(2*pi))*2*pi
```

```
plot(fp,x,-5*pi,5*pi)
```




```
add([plot(fourier(f,n),x,-3*pi,3*pi,color=hue(n/5)) for n in range(1,6)])+plot(fp,x,-3*pi,3*pi)
```




```

```