Profile class

The main class is `Profile`, representing a set of x,y data with related information and operations.

In [7]:

```
from pyProfile.profile_class import Profile
```

Can be defined in the most trivial way from x and y:

```
P = Profile(x, y, units=['mm','nm'], name='profile_1')
```

It is generally easy to write a routine to read its own format and return a Profile object.

Helper function `make_signal` (see Appendix or `make_signal?` for details) can be used to generate a (sinusoid-based) test profile.
I can use Python introspection to get info on each function:

In [9]:

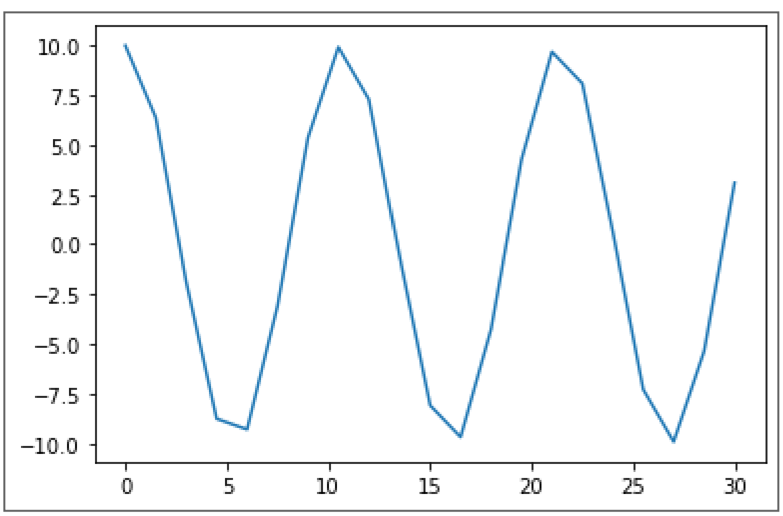
```
make_signal?
```

In [10]:

```
# use helper function to create x and y:
x,y = make_signal(amp=10.,L=30.,N=21,nwaves=2.8,ystartend=(0,0),noise=0)

# plot them with usual matplotlib commands:
plt.plot(x,y)
```

Out[10]:

```
[<matplotlib.lines.Line2D at 0x2f9e4cdf0b8>]
```



This is how a Profile object can be defined:

In [11]:

```
P = Profile(x,y,units=['mm','nm'],name='profile_1')
```

In [12]:

```
P.std()
```

Out[12]:

```
7.044127837632114
```

As well, `x` and `y` can be retrieved either as `P.x` and `P.y`, or with `x,y = P()`

In [13]:

```
P()
```

Out[13]:

```
(array([ 0. ,  1.5,  3. ,  4.5,
6. ,  7.5,  9. , 10.5, 12. , 1
3.5, 15. ,
        16.5, 18. , 19.5, 21. ,
22.5, 24. , 25.5, 27. , 28.5, 3
0. ]),
 array([10.        ,  6.3742399
, -1.87381315, -8.7630668 , -9.
29776486,
        -3.09016994,  5.3582679
5,  9.92114701,  7.28968627, -
0.6279052 ,
        -8.09016994, -9.6858316
1, -4.25779292,  4.25779292,
9.68583161,
         8.09016994,  0.6279052
, -7.28968627, -9.92114701, -5.
```

```
35826795,
         3.09016994]))
```

In [14]:

```
P.x
```

Out[14]:

```
array([ 0. ,  1.5,  3. ,  4.5,
6. ,  7.5,  9. , 10.5, 12. , 1
3.5, 15. ,
       16.5, 18. , 19.5, 21. ,
22.5, 24. , 25.5, 27. , 28.5, 3
0. ])
```

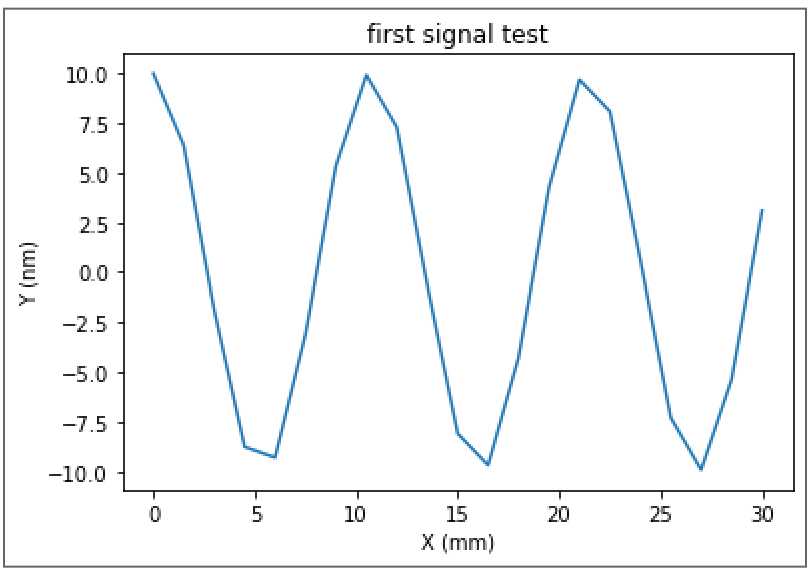
Plotting is standard python plotting (`matplotlib`), accept same arguments and manipulation.

In [15]:

```
P.plot()
plt.title('first signal test')
```

Out[15]:

```
Text(0.5, 1.0, 'first signal te
st')
```



Profile methods and functions

Algebric operations

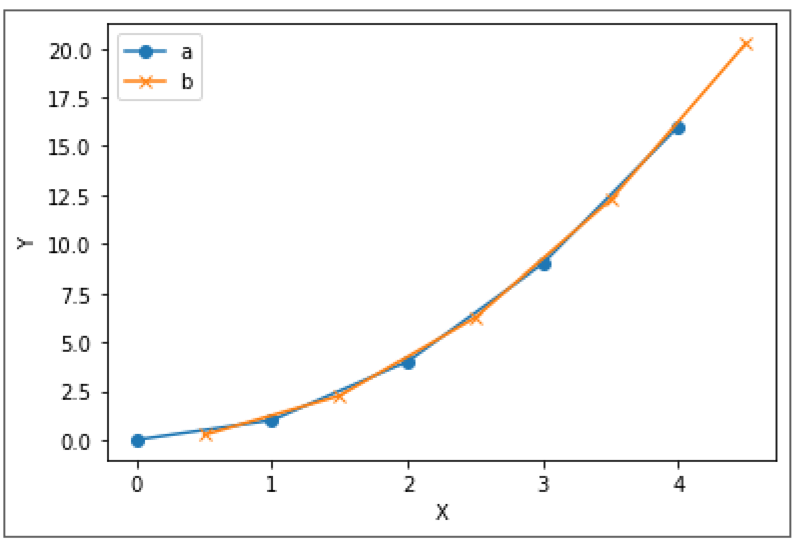
We build different test profiles.
Create two similar quadratic profiles `a` and `b` with different x values:

In [17]:

```
# Make different test profiles:

x0 = np.arange(5)

a = Profile(x0,x0**2)
a.plot(marker='o',ls='-',label = 'a')

b =  Profile(x0+0.5,(x0+0.5)**2)
b.plot(marker='x',ls='-',label = 'b')

plt.legend(loc=0)
```

Out[17]:

```
<matplotlib.legend.Legend at 0x2f9e5502b00>
```



Algebraic operations can be performed on `Profile` objects.
Resampling can be directly accessed by `resample` method, but there is usually no need to perform, because it is automatically handled by algebraic operations (resample on first by default,):

In [18]:

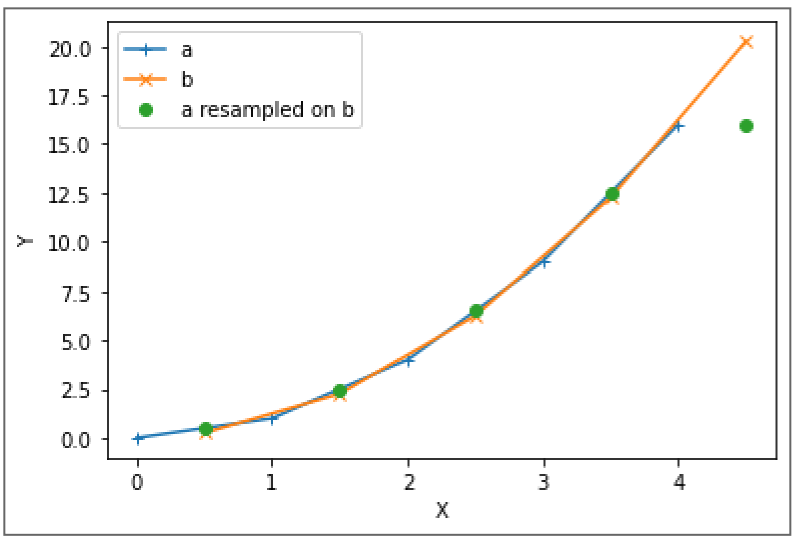
```
c = a.resample(b)
```

In [19]:

```
# plot interpolation

a.plot(marker='+',ls='-',label = 'a')
b.plot(marker='x',ls='-',label = 'b')
c.plot(marker='o',ls='',label='a resampled on b')

plt.legend(loc=0)
```

Out[19]:

```
<matplotlib.legend.Legend at 0x
2f9e557cfd0>
```



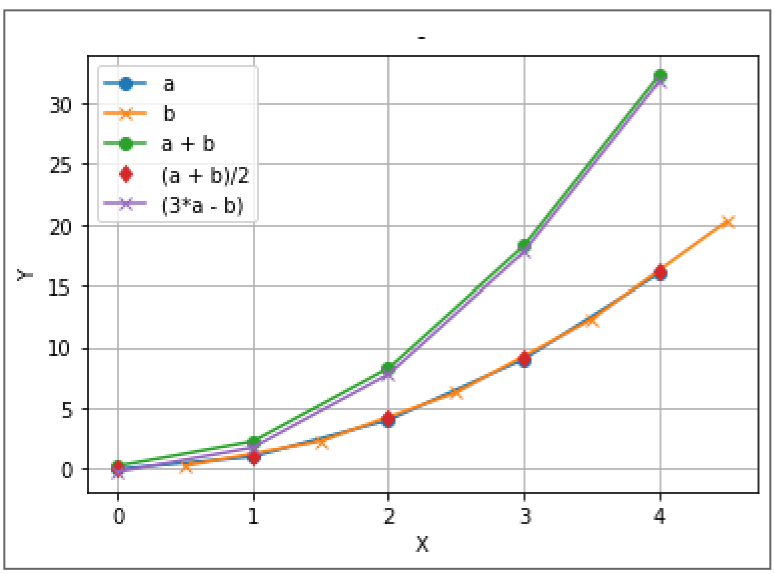
Here some examples of algebraic operations on different `x`:

In [20]:

```
a.plot(marker='o',ls='-', label = 'a')
b.plot(marker='x',ls='-', label = 'b')
(a+b).plot(label = 'a + b',marker='o')
((a+b)/2).plot(label = '(a + b)/2',marker='d',ls='')
(3*a-b).plot(label = '(3*a - b)',marker='x',ls='-')
plt.grid()
plt.legend(loc=0)
```

Out[20]:

```
<matplotlib.legend.Legend at 0x2f9e5615748>
```

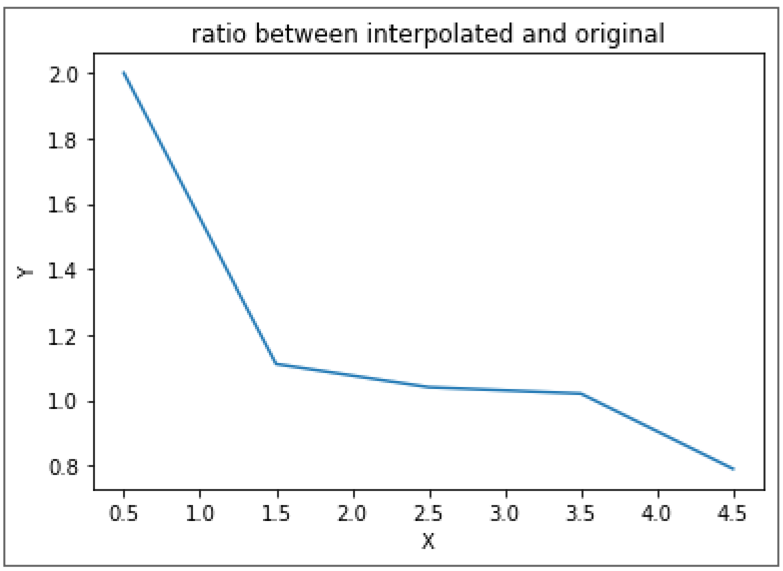


In [21]:

```
#(a/b).plot(label='a/b')
#(b/a).plot(label='b/a')
(c/b).plot()
plt.title('ratio between interpolated and original')
```

Out[21]:

```
Text(0.5, 1.0, 'ratio between i
nterpolated and original')
```



Leveling

Outliers filtering

TBD

In [24]:

```
a=0
```

In [25]:

```
a = 1
```

In [26]:

```
print(a)
```

```
1
```

In [ ]:

```
```

In [ ]:

```
```

In [ ]:

```
```