

小考考題：

(1) A sawtooth signal has a waveform that ramps up linearly from -1 to 1, then drops immediately to -1 and repeats. See http://en.wikipedia.org/wiki/Sawtooth_wave (http://en.wikipedia.org/wiki/Sawtooth_wave).

- .1. Write a class called **【Yourname_Sawtooth】** that extends **Signal** and provides **evaluate** to evaluate a sawtooth signal. Note: Yourname is 個別學生的名字(英文縮寫就可以)

(for the following problems, you can use **【Yourname_Sawtooth】** or the others (like that from thinkdsp.py))

- .2. Generate a Sawtooth signal, with frequency= 1000 Hz, amplitude= 10, plot it.
- .3. Compute the spectrum of the sawtooth wave as the above, plot it.

```
In [1]: #(.1)

from thinkdsp import Sinusoid
import numpy as np

class RySawtoothSignal(Sinusoid):
    """ry Represents a sawtooth signal."""

    def evaluate(self, ts):

         $\theta = ts * 2 * \pi * \text{self.freq} + \text{self.offset}$  # 在此作橫軸之變數變換

         $\theta = \theta \% (\pi * 2)$  # 這一行讓  $\theta$  周而復始，週期維持在  $(2\pi)$ 

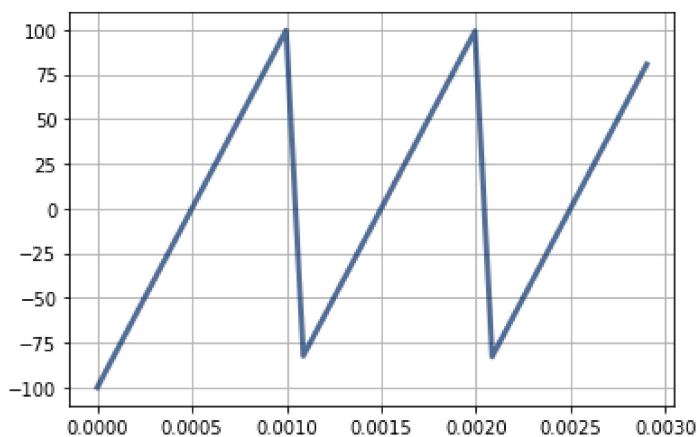
         $x = -1 + \theta / \pi$  # 從 -1 開始爬坡，上半週期到達 0，下半週期到達 +1

         $x = x * \text{self.amp}$  # 最後輸出前，再把縱軸拉到 振幅 = amp

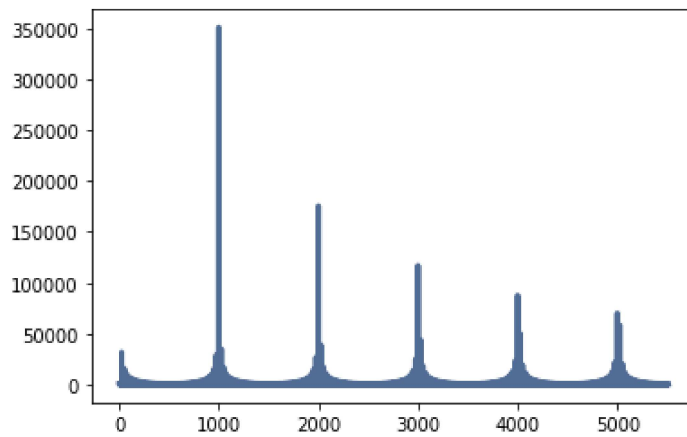
        return x
```

```
In [2]: # (.2)
# Let's test what we have created
import matplotlib.pyplot as plt

x = RySawtoothSignal(freq=1000, amp=100)
x.plot()
plt.grid()
```



```
In [3]: # (.3)
# make its spectrum
w= x.make_wave()
s= w.make_spectrum()
s.plot()
```



(2) 本程式原始碼在此連結：

https://github.com/renyuanL/_ryDsp2020/blob/master/homework/signalAndSystemTest20200417.ipynb
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