ECE 486 S23 Project Section 1

@author Laurent Zheng (20818351)

Initialize the static parameters of the signal

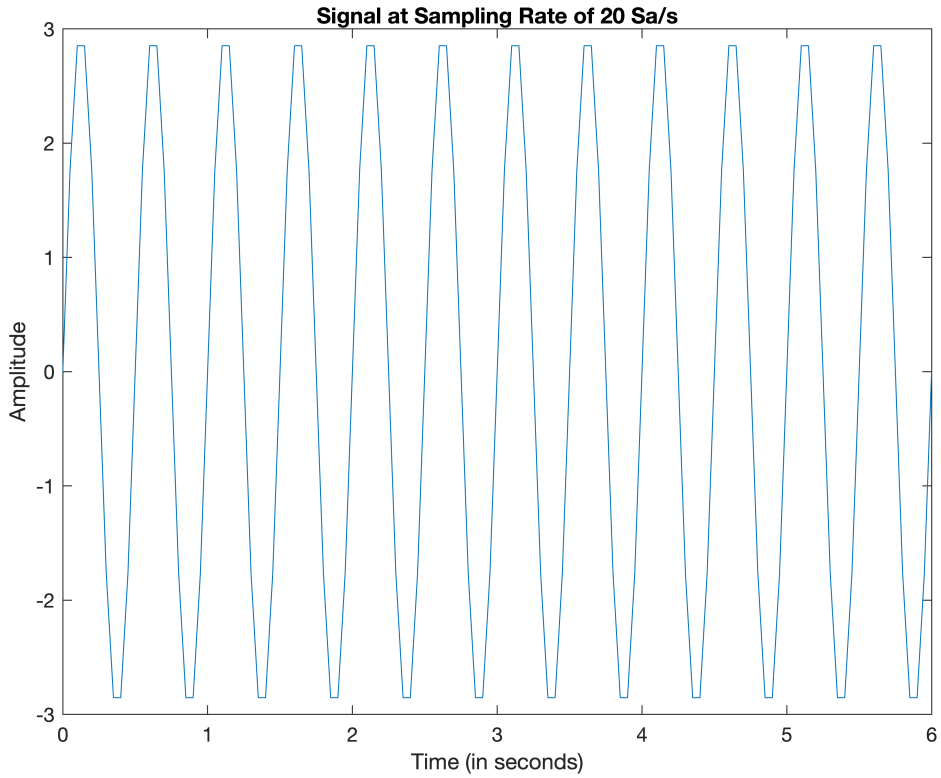
```
% Initialize your variables such as amplitude and frequency
A = 3; % Amplitude
f = 2; % Frequency, in Hertz
T = 6; % Total time, in seconds
```

Plot at 20 Sa/s

```
sf1 = 20; % Sampling frequency, in Hertz
ts1 = 1/sf1; % Time step (inverse of sampling frequency)
t1 = 0:ts1:T; % Time vector (a vector containing 0, ts, 2ts, 3ts, ... T)
x1 = A * sin(2 * pi * f * t1)
```

```
x1 = 1×121
         0    1.7634    2.8532    2.8532    1.7634    0.0000   -1.7634   -2.8532 ···
```

```
plot(t1,x1);
xlabel('Time (in seconds)');
ylabel('Amplitude');
title('Signal at Sampling Rate of 20 Sa/s');
```

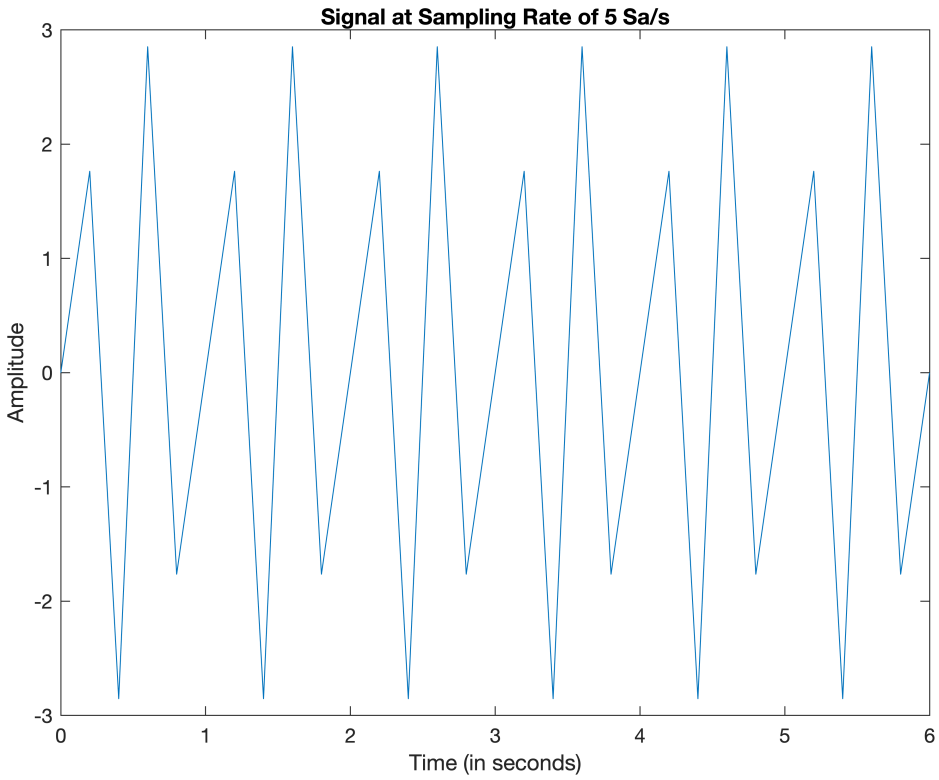


Plot at 5 Sa/s

```
sf2 = 5; % Sampling frequency, in Hertz
ts2 = 1/sf2; % Time step (inverse of sampling frequency)
t2 = 0:ts2:T; % Time vector (a vector containing 0, ts, 2ts, 3ts, ... T)
x2 = A * sin(2 * pi * f * t2)
```

```
x2 = 1×31
         0    1.7634   -2.8532    2.8532   -1.7634   -0.0000    1.7634   -2.8532 ···
```

```
plot(t2,x2);
xlabel('Time (in seconds)');
ylabel('Amplitude');
title('Signal at Sampling Rate of 5 Sa/s');
```



The plots at the different sample rates look different because the sampling rate changes the density of points to represent the sine wave. A higher sampling rate will result in a smoother looking signal while the lower will look more jagged. On the other hand, both signals are sampled above Nyquist rate, and can represent the same signal with no aliasing.