



《数字信号处理》

(HOMEWORK1)

学 院 名 称 : 数据科学与计算机学院

专业 (班级) : 16 软件工程电子政务

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时 间 : 2019 年 3 月 10 日

● Write a Matlab program to plot a continuous-time sinusoidal signal and its sampled version, and verify Figure 2.28. You need to use the hold function to keep both plots.

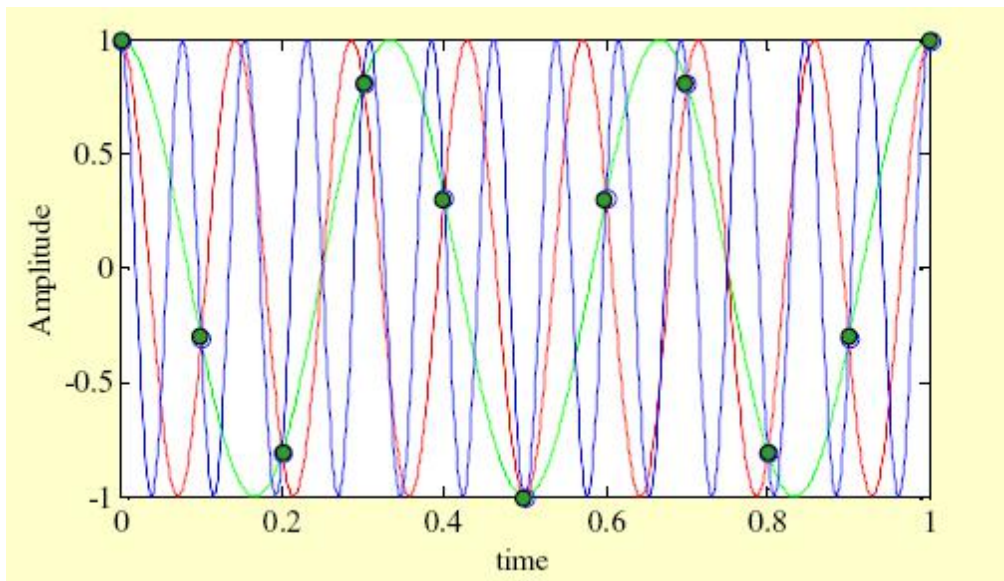


Figure 2.28

源代码:

```
% user input data
f = input('Frequency Of Sinusoid:');
n = input('Samplig Frequency:');
u = input('Amplitude: ');
% signal
t = 0:0.001:1;
g1 = u*cos(2*pi*f*t);
plot(t,g1,'-');
ylabel('x(t)');
hold on ;
ns = 0:1:n;
gs = u*cos(2*f*pi*ns/n);
plot(ns/n,gs,'o');hold off
```

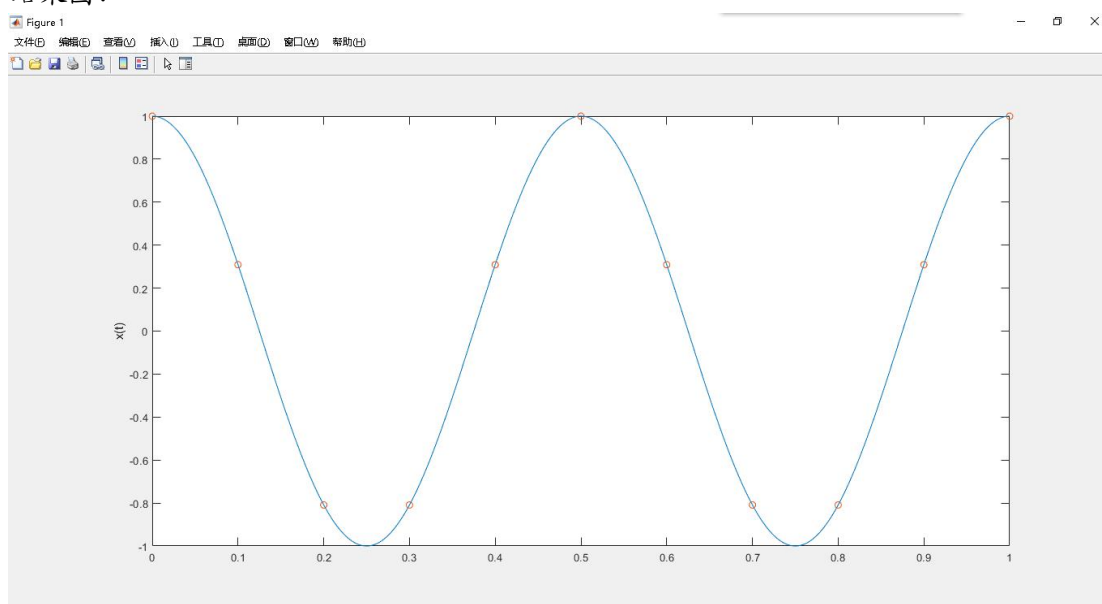
命令行截图：

```

命令行窗口
//
>>
>>
>> exercise2
Frequency Of Sinusoid: 2
Samplig Frequency: 10
Amplitude: 1
fx >> |
<

```

结果图：



● Using the program developed in the previous problem, verify experimentally that the family of continuous-time sinusoids given by Eq.(2.65) lead to identical sampled signals.

Eq.(2.65)

$$x_{a,k}(t) = A \cos(\pm \Omega_0 t + \phi) + k\Omega_T t), k = 0, \pm 1, \pm 2, \dots$$

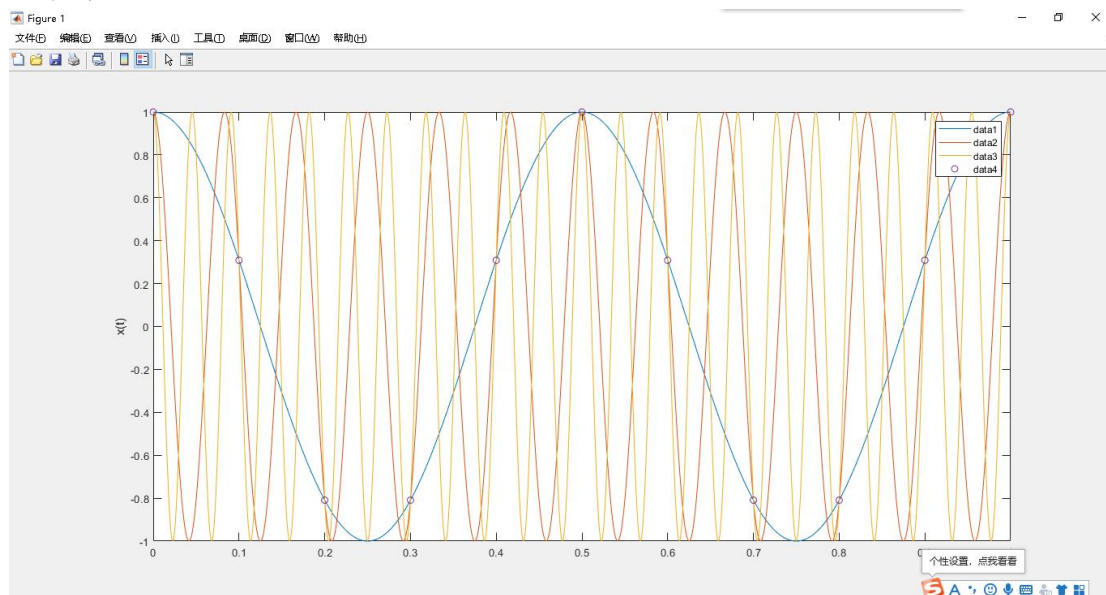
源代码:

```
% user input data
f = input('Frequency Of Sinusoid:');
n = input('Samplig Frequency:');
u = input('Amplitude: ');
% signal
t = 0:0.001:1;
g1 = u*cos(2*pi*f*t);
plot(t,g1,'-');
ylabel('x(t)');
hold on;
g2 = u*cos(2*pi*f*t+n*2*pi*t);
plot(t,g2,'-');
hold on;
g3 = u*cos(2*pi*f*t+2*n*2*pi*t);
plot(t,g3,'-');
hold on;
ns = 0:1:n;
gs = u*cos(2*f*pi*ns/n);
plot(ns/n,gs,'o');hold off
```

命令行截图:

```
命令行窗口
>> exercisel
Frequency Of Sinusoid:2
Samplig Frequency:10
Amplitude: 1
>>
```

结果图:



因为未找到图2.28所对应的原信号频率以及采样频率，所以题一与题二采用自定义数据。利用上述的代码与数据生成的图像，如图所示采样点与在三个信号聚集的点相重合。则说明如果 $\Omega_t > 2\Omega_0$ ，利用公式2.65产生的信号会得到同样的采样信号。