Github 账号：whqxbs

实验摘要：

1、 了解 matlab 常用命令，掌握信号与系统相关的绘图命令.

2、 绘制常见的信号图形

实验题目

1. 利用MATLAB实现下列信号，并绘出图形

(1) $f_1(t)=\varepsilon(t)$，取 $t=-1\sim10$

(2) $f_2(t)=4e^{-0.5t}\cos(\pi t)$，取 $t=0\sim10$

(3) $f_3(t)=g_2(t)+g_4(t)$，取 $t=-10\sim10$

(4) $f_4(k)=\varepsilon(k+2)-\varepsilon(k-5)$

(5) $f_5(k)=7(0.6)^k\cos(0.9\pi k)$

(6) $f_6(t)=Sa(t)=\sin(t)/t$

2. 利用MATLAB实现以上信号 $f_3(t)$ 的变化：

(1) $f_3(2t)$

(2) $f_3(4-2t)$

(3) $f_3'(4-2t)$

3、

*** Write a function called square_wave that computes the sum

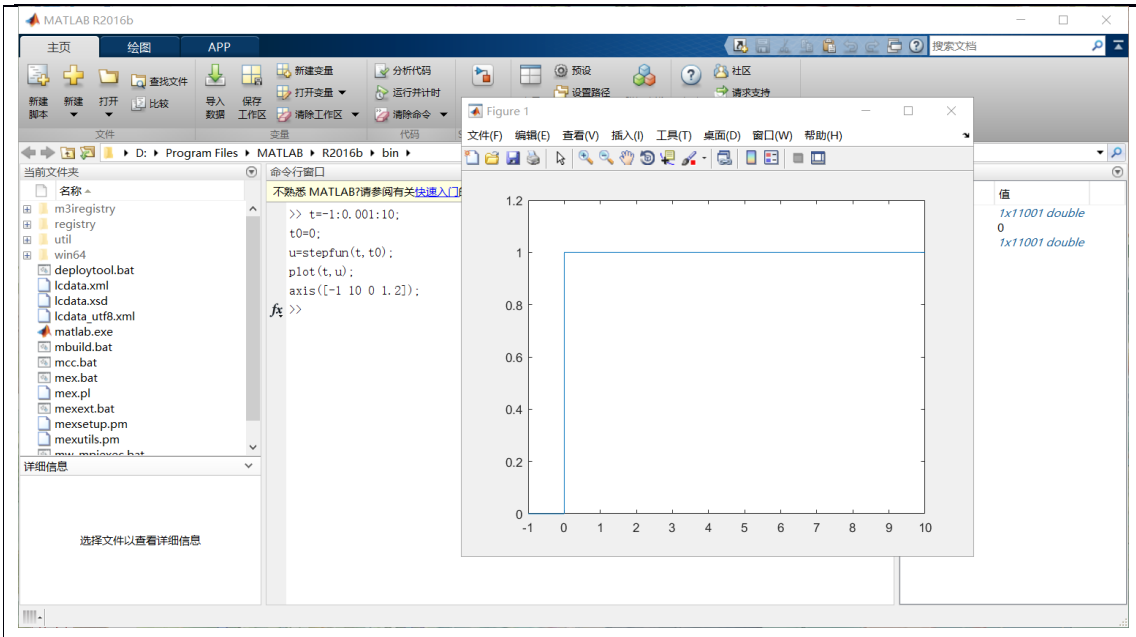
$$\sum_{k=1}^{n}\frac{\sin((2k-1)t)}{(2k-1)}$$

for each of 1001 values of t uniformly spaced from 0 to 4π inclusive. The input argument is a positive scalar integer n, and the output argument is a row vector of 1001 such sums—one sum for each value of t. You can test your function by calling it with n == 200 or greater and plotting the result, and you will see why the function is called "square_wave".

实验内容

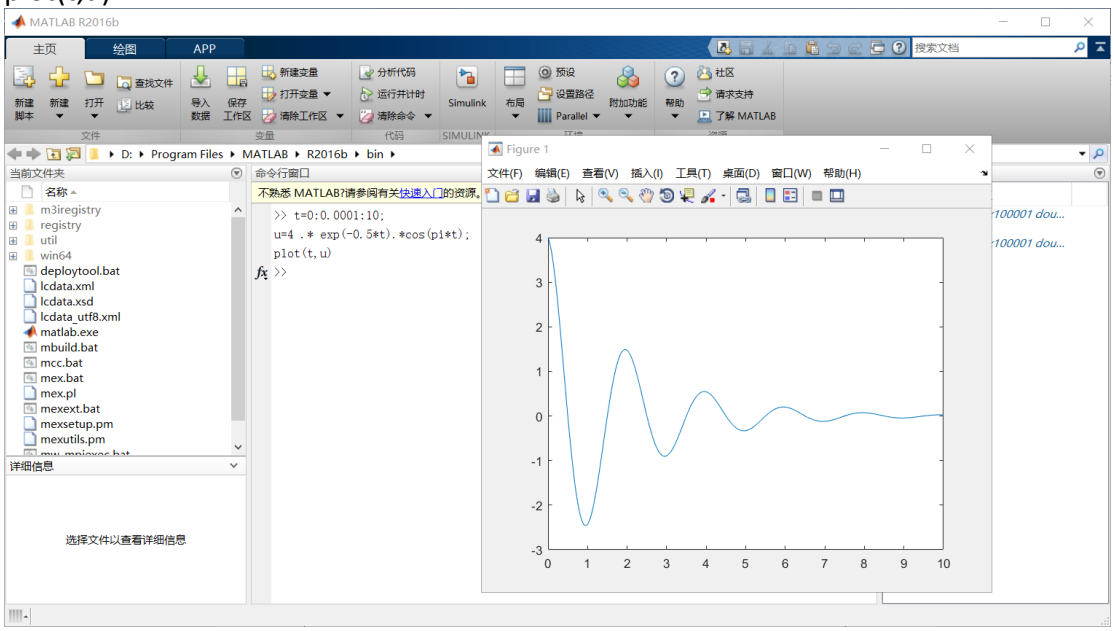
1、(1) $f_1(t)=\varepsilon(t)$，取 $t=-1\sim10$

```
t=-1:0.001:10;
t0=0;
u=stepfun(t,t0);
plot(t,u);
axis([-1 10 0 1.2]);
```



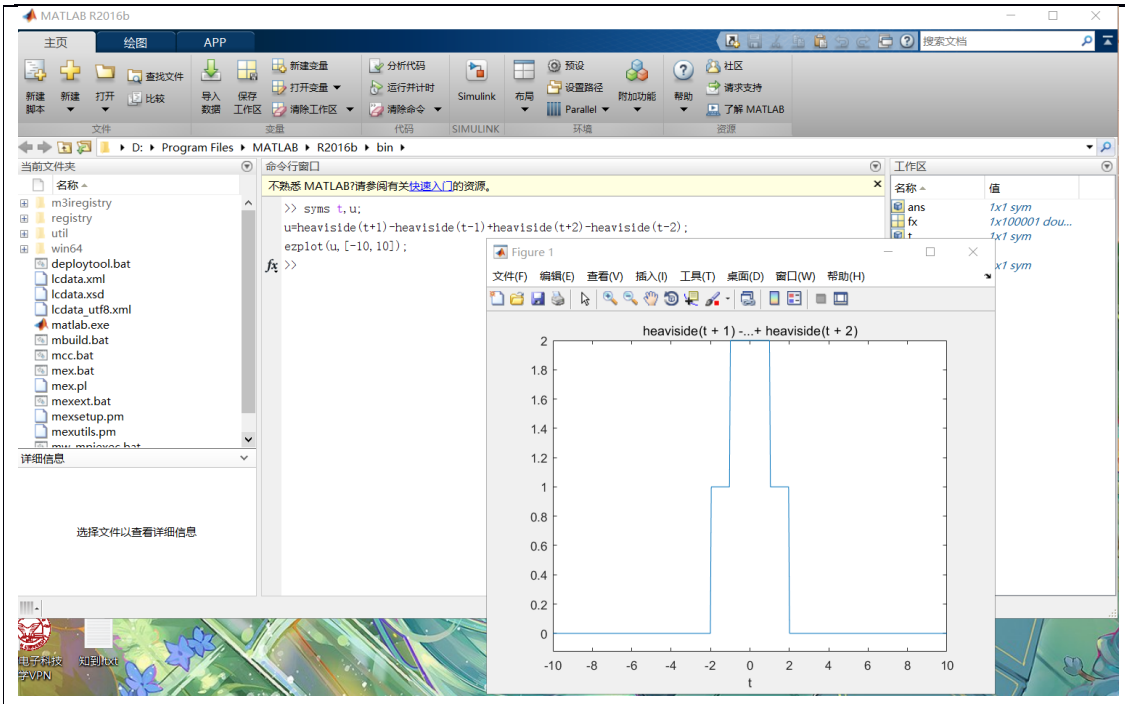
(2) $f_2(t)=4e^{-0.5t}\cos(\pi t)$， 取 $t=0\sim10$

```
t=0:0.0001:10;
u=4 .* exp(-0.5*t).*cos(pi*t);
plot(t,u)
```



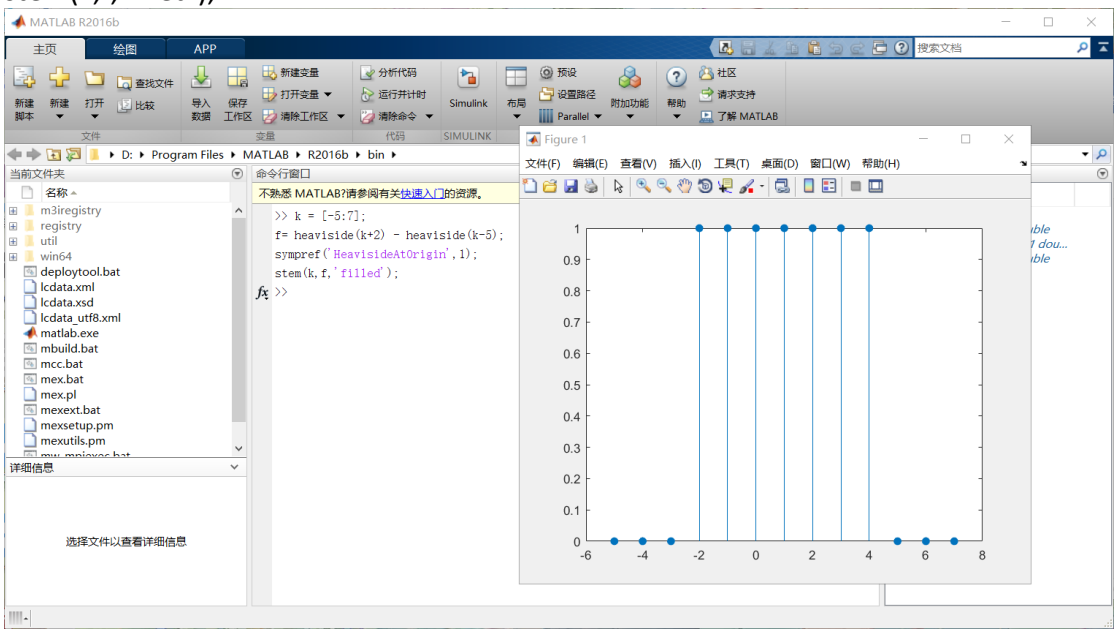
(3) $f_3(t)=g_2(t)+g_4(t)$， 取 $t=-10\sim10$

```
syms t,u;
u=heaviside(t+1)-heaviside(t-1)+heaviside(t+2)-heaviside(t-2);
ezplot(u,[-10,10]);
```



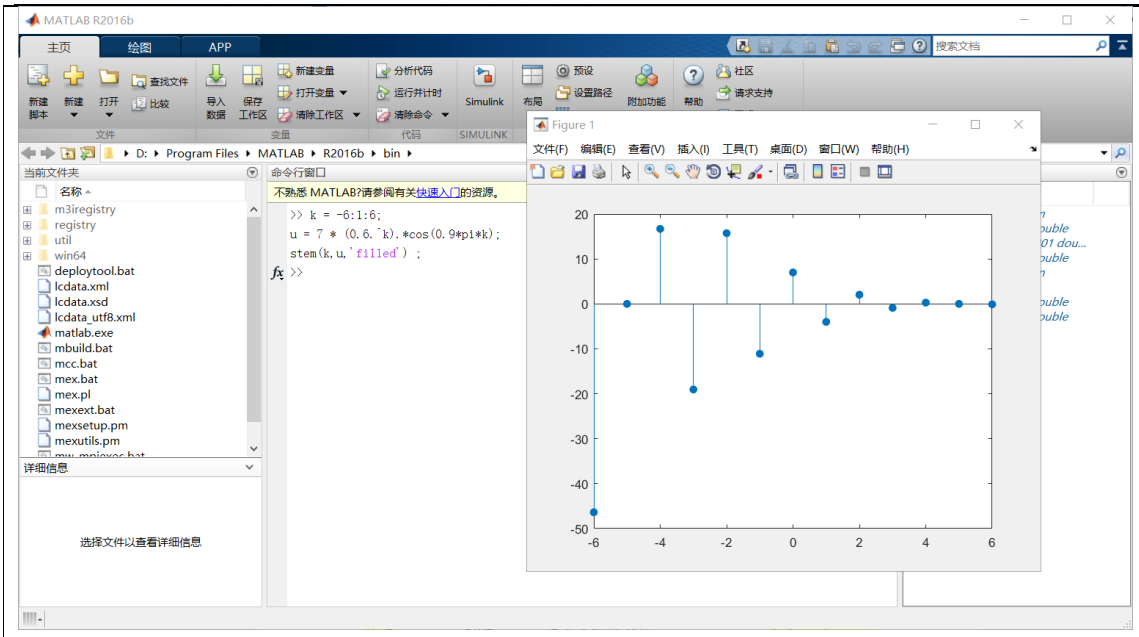
(4) $f_4(k)=\varepsilon(k+2)-\varepsilon(k-5)$

```
k = [-5:7];
f= heaviside(k+2) - heaviside(k-5);
sympref('HeavisideAtOrigin',1);
stem(k,f,'filled');
```



(5) $f_5(k)=7(0.6)^k\cos(0.9\pi k)$

```
k = -6:1:6;
u = 7 * (0.6.^k).*cos(0.9*pi*k);
stem(k,u,'filled') ;
```

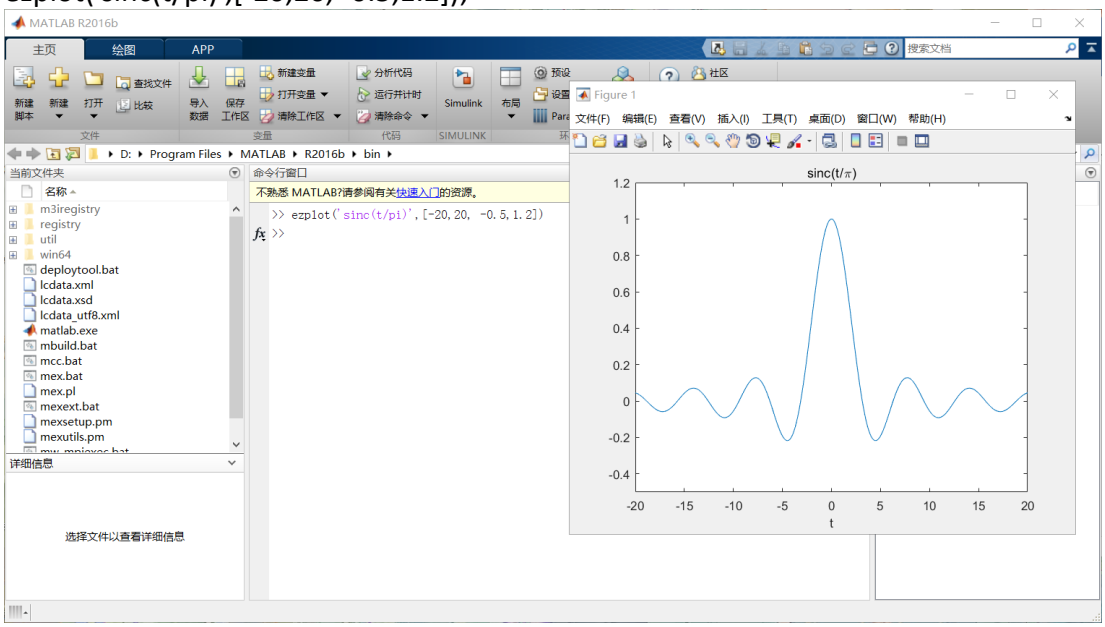


(6) $f_6(t) = Sa(t) = \sin(t)/t$

$$\operatorname{sinc} t = \begin{cases} \dfrac{\sin \pi t}{\pi t} & t \neq 0, \\ 1 & t = 0. \end{cases}$$

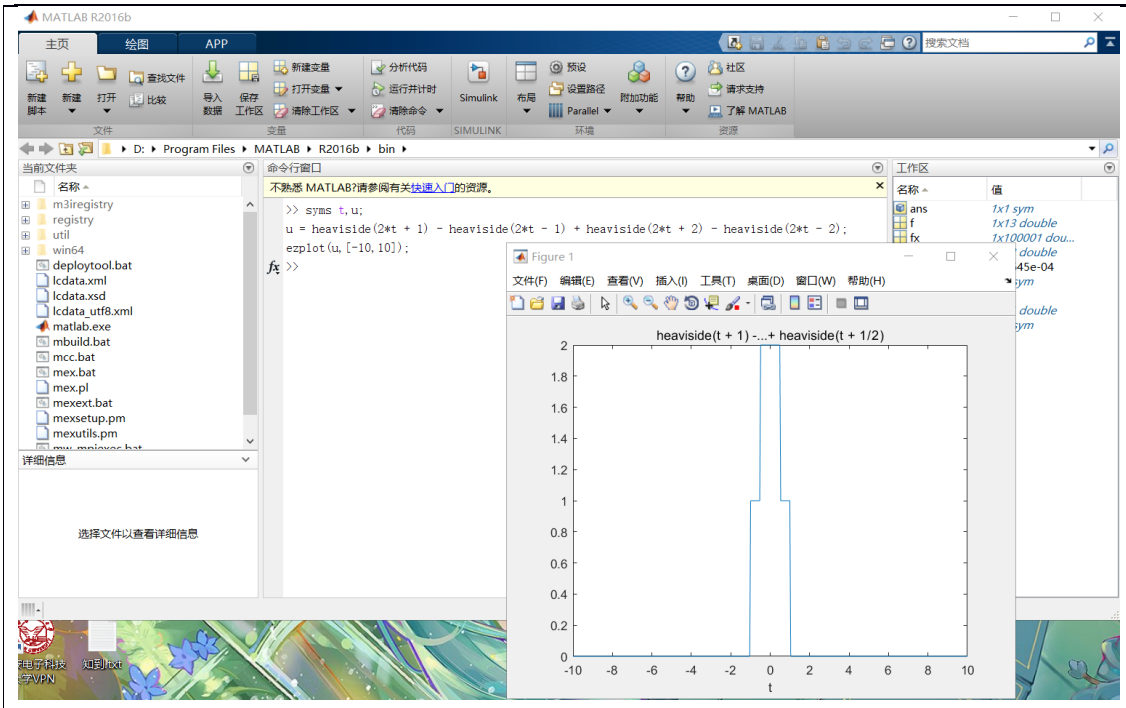
Matlab 中自带了抽样函数 ，因此 Sa(t)=sinc(t/π).

ezplot('sinc(t/pi)',[-20,20, -0.5,1.2]);



2、(1) $f_3(2t)$

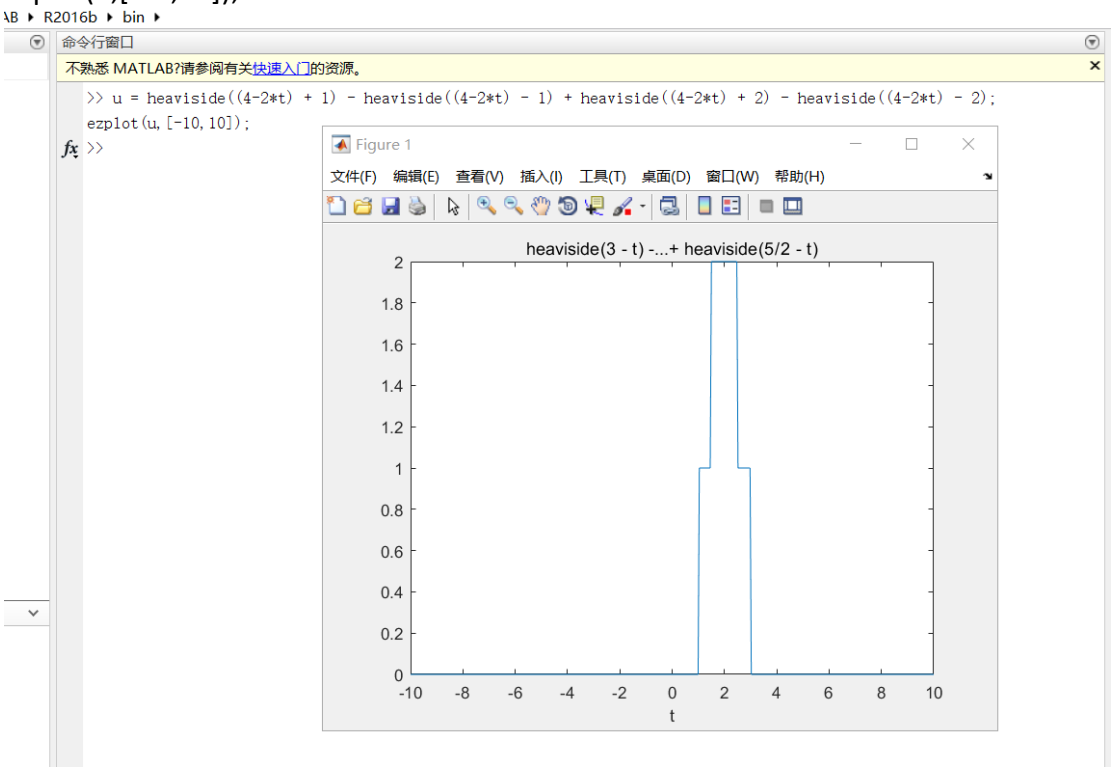
```
syms t,u;
u = heaviside(2*t + 1) - heaviside(2*t - 1) + heaviside(2*t + 2) - heaviside(2*t - 2);
ezplot(u,[-10,10]);
```



(2) $f_3(4-2t)$

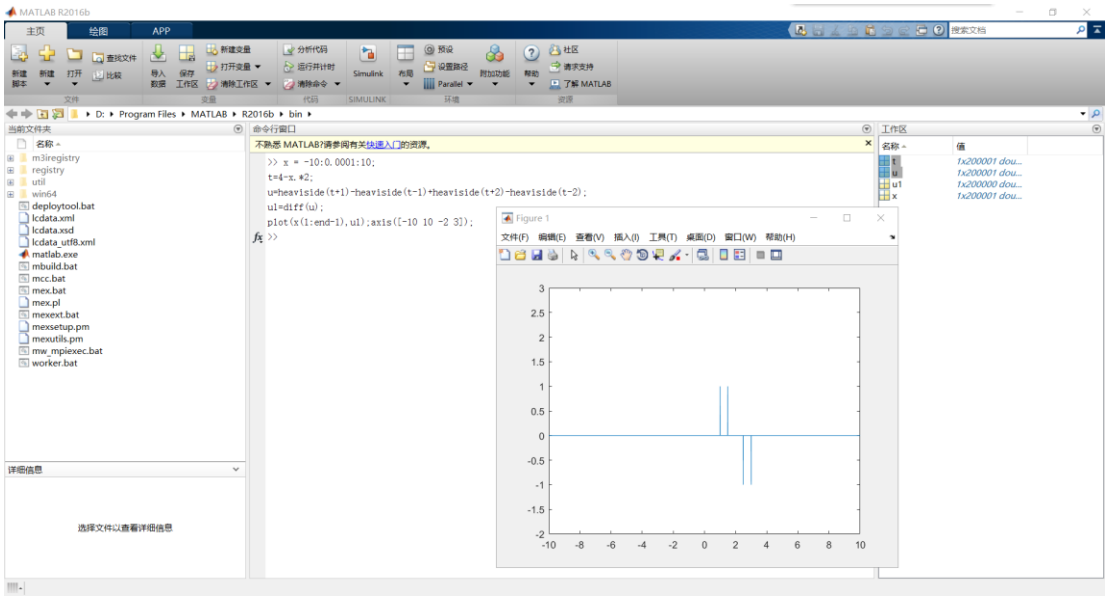
u = heaviside((4-2*t) + 1) - heaviside((4-2*t) - 1) + heaviside((4-2*t) + 2) - heaviside((4-2*t) - 2);

ezplot(u,[-10,10]);

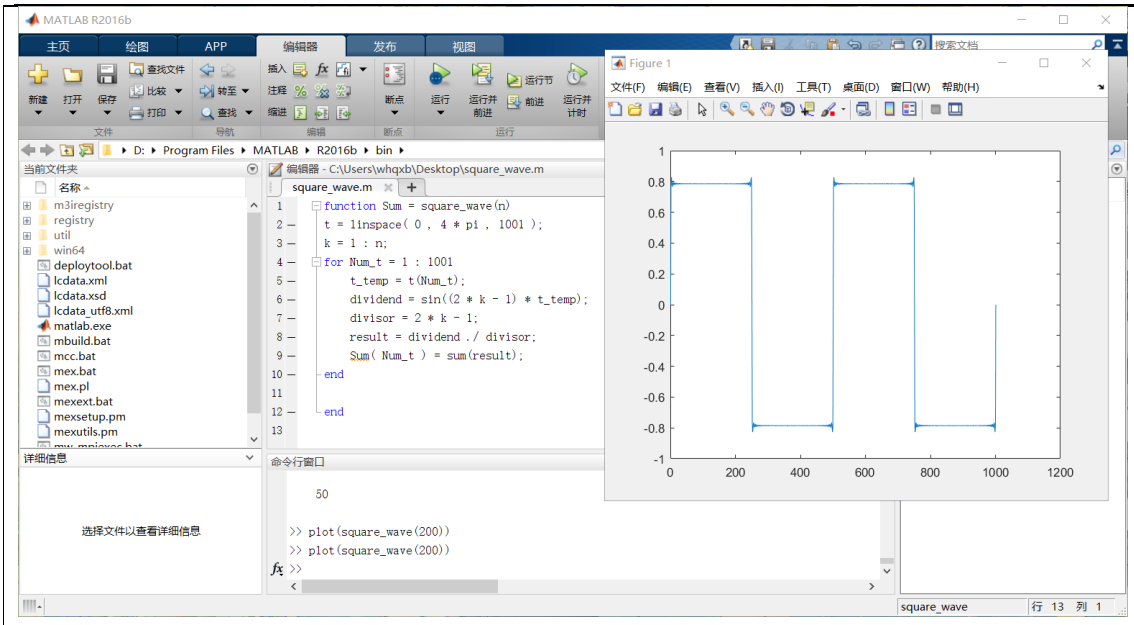


(3) $f_3'(4-2t)$

```
x = -10:0.0001:10;

t=4-x.*2;

u=heaviside(t+1)-heaviside(t-1)+heaviside(t+2)-heaviside(t-2);

u1=diff(u);

plot(x(1:end-1),u1);axis([-10 10 -2 3]);
```



3、
```
function Sum = square_wave(n)
t = linspace( 0 , 4 * pi , 1001 );
k = 1 : n;
for Num_t = 1 : 1001
    t_temp = t(Num_t);
    dividend = sin((2 * k - 1) * t_temp);
    divisor = 2 * k - 1;
    result = dividend ./ divisor;
    Sum( Num_t ) = sum(result);
end
end
```



实验总结

Matlab 莫名会卡死，搜索引擎太强大了

参考文献

https://zhidao.baidu.com/question/1604171472532348787.html

https://wenku.baidu.com/view/d366d2be1a37f111f1855b17.html?qq-pf-to=pcqq.group

https://blog.csdn.net/Reborn_Lee/article/details/82866039