Github 账号：117503445

实验摘要： 学习 MATLAB，使用 MATLAB 对信号进行处理并做图。

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) $f_3{}'(4-2t)$

9. *** Write a function called `square_wave` that computes the sum

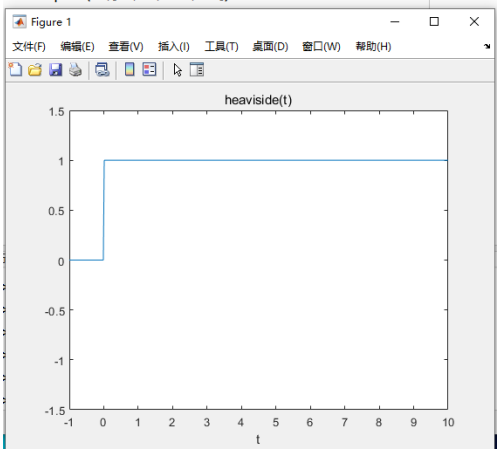
$$\sum_{k=1}^{n}\frac{\sin((2k-1)t)}{(2k-1)}$$

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

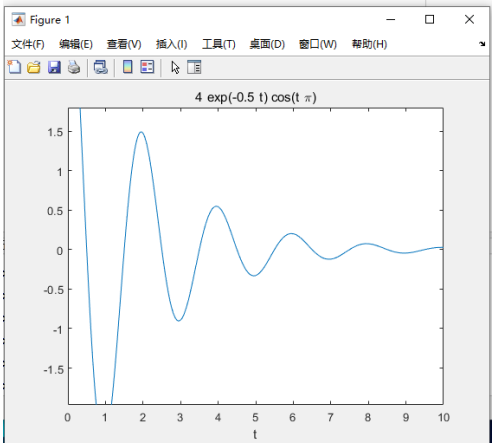
1.1

```
ut=str2sym('heaviside(t)');
ezplot(ut,[-1,10,-1.5,1.5])
```

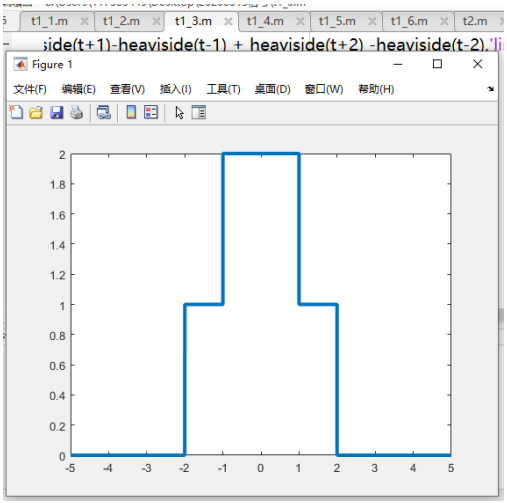


1.2

```
ut=str2sym('(4*exp(1)^(-0.5*t))*cos(pi*t)');
ezplot(ut,[0,10])
```

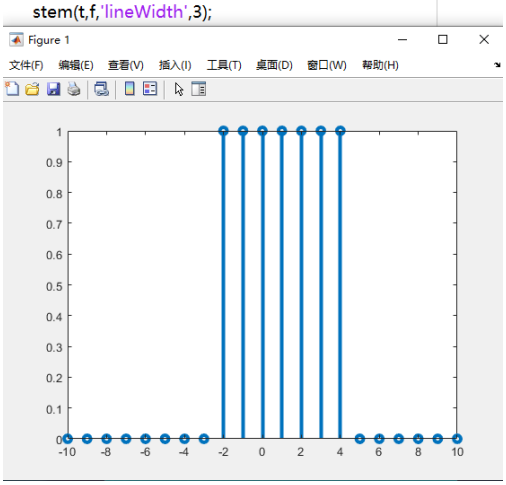


1.3



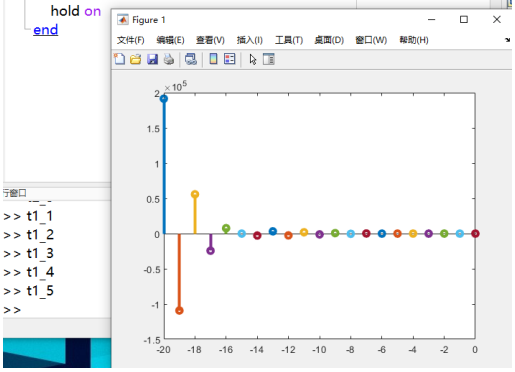
1.4

```
t = -10:10;
f = hea(t+2) - hea(t-5);
stem(t,f,'lineWidth',3);
```



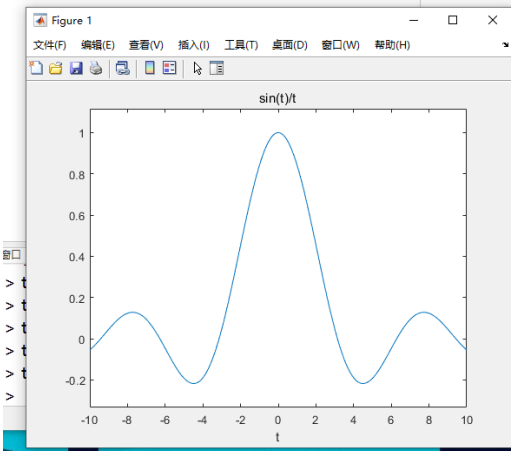
1.5

```
for t=-20:0
    f =7*(0.6^t)*cos(0.9*pi*t);
    stem(t,f,'lineWidth',3);
    hold on
end
```



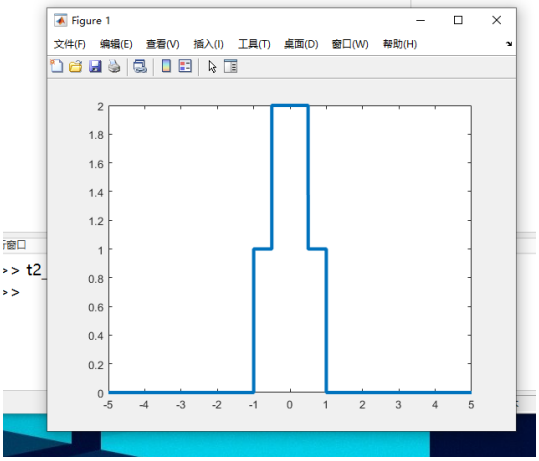
1.6

```
ut=str2sym('sin(t)/t');
ezplot(ut,[-10,10])
```



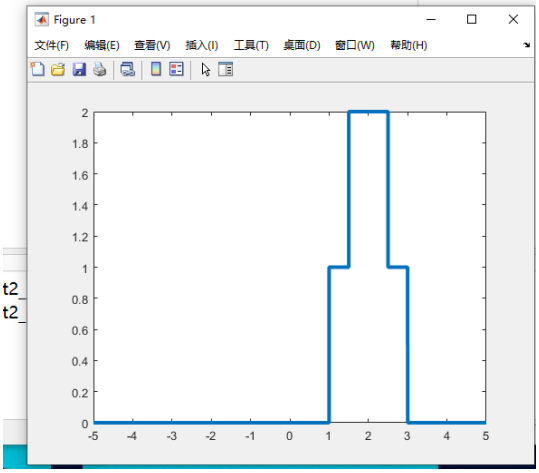
2.1

```
fplot(@(t) heaviside(2*t+1)-heaviside(2*t-1) + ...
heaviside(2*t+2) -heaviside(2*t-2),'lineWidth',3);
```



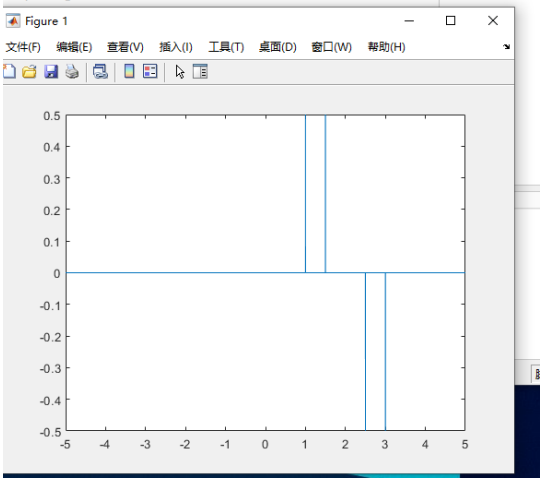
2.2

```
fplot(@(t) heaviside(4-2*t+1)-heaviside(4-2*t-1)...
    + heaviside(4-2*t+2) -heaviside(4-2*t-2),'lineWidth',3);
```



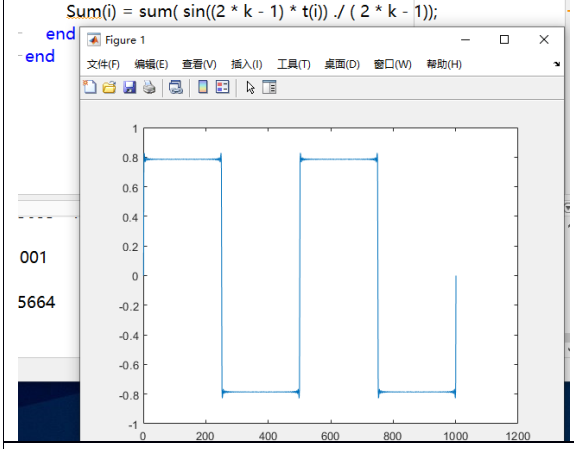
2.3

```
g=-5:0.001:5;
t=4-g.*2;
f=heaviside(t+1)-heaviside(t-1)+heaviside(t+2)-heaviside(t-2)
f=diff(f, 1);
plot(g(1:end-1), f);
```



12

```
function Sum = squarewave(n)
    t = linspace(0, 4 * pi, 1001)
    k = 1:n;
    for i = 1:1001
        Sum(i) = sum( sin((2 * k - 1) * t(i)) ./ ( 2 * k - 1));
    end
end
```



实验总结

不熟悉语法，在一些实现上存在妥协，不够优雅。

参考文献

https://www.mathworks.com/help/matlab/ref/plot.html

https://www.mathworks.cn/help/matlab/ref/ezplot.html

https://www.ilovematlab.cn/thread-266284-1-1.html

https://jingyan.baidu.com/article/495ba841c70e1538b20ede61.html