**lab 14:**

**19L-1316**

**task 1:**

**syms t w;**

**w=[-10:0.01:10];**

**x=heaviside(t+2)-(heaviside(t-2));**

**X=fourier(x);**

**t=[-5:0.01:5];**

**x=heaviside(t+2)-heaviside(t-2);**

**XW=(cos(2.\*w).\*1i)+(sin(2.\*w)./w)-((cos(2.\*w).\*1i)-(sin(2.\*w)./w));**

**subplot(221),plot(t,x,'linewidth',2);**

**axis([-10 10 0 1]);**

**title('x(t)'),xlabel('t -> -10\leqt\leq10'),ylabel('y axis');**

**subplot(222),plot(w,XW,'linewidth',2);**

**title('X(w)'),xlabel('w -> -10\leqt\leq10'),ylabel('y axis');**

**X2=(cos(2.\*t).\*1i)+(sin(2.\*t)./t)-((cos(2.\*t).\*1i)-(sin(2.\*t)./t));**

**subplot(223),plot(t,X2,'linewidth',2);**

**title('X2(t)'),xlabel('w -> -10\leqt\leq10'),ylabel('y axis');**

**XW2=heaviside((-w)+2)-(heaviside((-w)-2));**

**XW2=2\*pi\*XW2;**

**subplot(224),plot(w,2\*pi\*XW2,'linewidth',2);**

**title('2 pi x(w)'),xlabel('t -> -10\leqt\leq10'),ylabel('y axis');**

**task 2:**

**syms t w;**

**w=[-10:0.01:10];**

**x=exp(-2.\*t).\*heaviside(t);**

**X=fourier(x);**

**t=[-5:0.01:5];**

**x=exp(-2.\*t).\*heaviside(t);**

**XW=1./(2 + w.\*1i);**

**subplot(221),plot(t,x,'linewidth',2);**

**subplot(222),plot(w,XW,'linewidth',2);**

**X2=1./(2 + t.\*1i);**

**subplot(223),plot(t,X2,'linewidth',2);**

**XW2=exp(-2\*(-w)).\*heaviside(-w);**

**XW2=2\*pi\*XW2;**

**subplot(224),plot(w,2\*pi\*XW2,'linewidth',2);**

**task 3:**

**syms t w w1 t1;**

**w=[-10 : 0.01 : 10];**

**x= 2.\*triangularPulse(-2,0,2,t);**

**XW=fourier(x);**

**XW=-(exp(-w.\*2i).\*(exp(w.\*2i) - 1).^2)./(w.^2);**

**mag\_xw=abs(XW);**

**ang\_xw=angle(XW);**

**t=[-10 : 0.01 : 10];**

**x= 2.\*triangularPulse(-2,0,2,t);**

**subplot(331),plot(t,x,'linewidth',2);**

**subplot(332),plot(w,mag\_xw,'linewidth',2);**

**subplot(333),plot(w,ang\_xw,'linewidth',2);**

**xd=diff(2.\*triangularPulse(-2,0,2,t1));**

**xd=rectangularPulse(-2, 0, t1) - rectangularPulse(0, 2, t1);**

**XD=fourier(xd);**

**XD=(exp(-w.\*2.\*i).\*(exp(w.\*2.\*i).\*1i - 1i).^2.\*1i)./w;**

**mag\_xd=abs(XD);**

**ang\_xd=angle(XD);**

**t1=[-10: 0.01 : 10];**

**xd=rectangularPulse(-2, 0, t1) - rectangularPulse(0, 2, t1);**

**subplot(334),plot(t1,xd,'linewidth',2);**

**subplot(335),plot(w,mag\_xd,'linewidth',2);**

**subplot(336),plot(w,ang\_xd,'linewidth',2);**

**XW=-(exp(-w1.\*2i).\*(exp(w1.\*2i) - 1).^2)./(w1.^2);**

**XW=j.\*w1.\*XW;**

**XI=ifourier(XW,w1,t);**

**mag\_xi=abs(XI);**

**ang\_xi=angle(XI);**

**subplot(337),plot(t1,XI,'linewidth',2);**

**subplot(338),plot(w,mag\_xi,'linewidth',2);**

**subplot(339),plot(w,ang\_xi,'linewidth',2);**