**CHAPTER 12**

# REPRESENTING PERIODIC SIGNALS

**12.1   Pertinent Signal Attributes**

**12.1.1   Fundamental Period**

**12.1.2   Fundamental Frequency**

**12.1.3   Side Note: Choosing step size when plotting**

**12.2   Singularity Functions**

**12.2.1   Heaviside Function**

```
1  function out=u(t)
2      out=(t>0).*1;
```
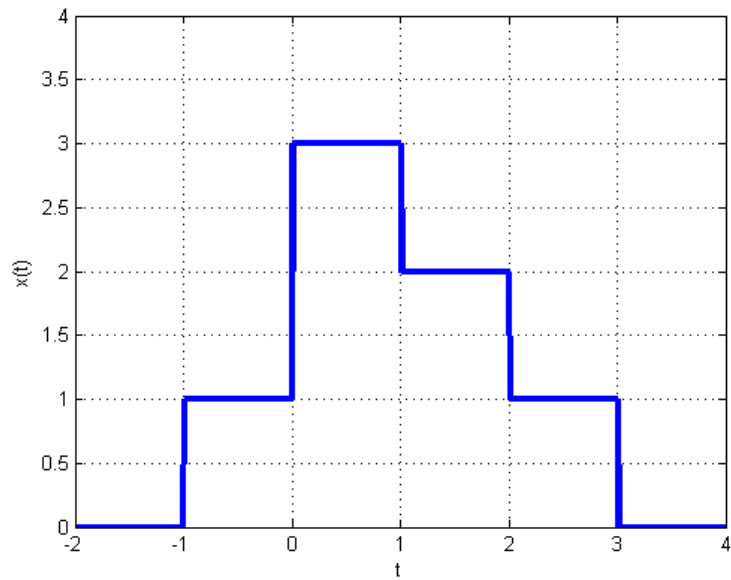
**12.2.2   Pulse Function**

**12.2.3   Ramp Function**

```
1  function out=r(t)
2  out=t.*u(t);
```

### 12.2.4 Dirac Delta Functions

### 12.3 Approaches to Signal Representation



```
1   clear all
2   close all
3   clc
4
5   format short eng
6
7   t=-2:.01:4;
8   x=u(t+1)+2*u(t)-u(t-1)-u(t-2)-u(t-3);
9
10  figure(1)
11  plot(t,x,'LineWidth',3,'Color',[1, .3 0])
12  hold on
13  grid on
14  ylim([0,4])
15  axis square
16  fig=gcf;
17  set(findall(fig,'-property','FontSize'),'FontSize',14)
```
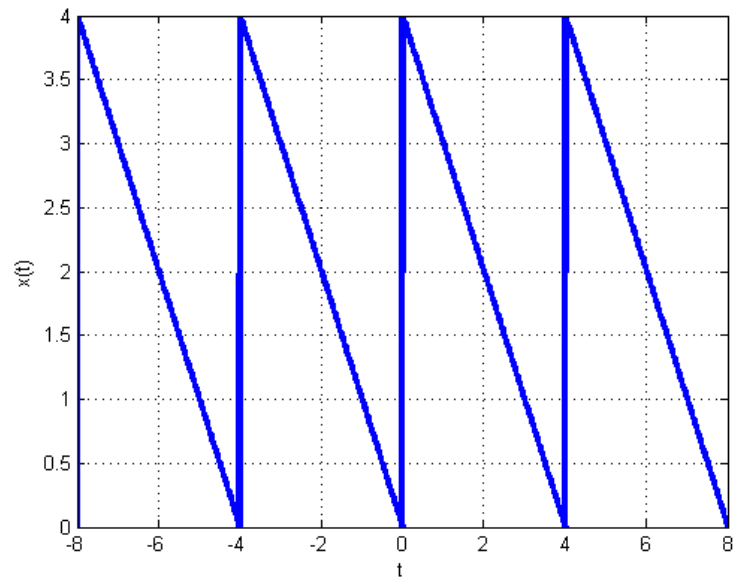
```
1   clear all
2   close all
3   clc
4
5   format short eng
6
7   t=-2:.01:4;
8   x=(1)*(u(t+1)-u(t))+(3)*(u(t)-u(t-1))+(2)*(u(t-1)-u(t-2))+(1)*(u(t-2)-u(t
        -3));
9
10  figure(1)
11  plot(t,x,'LineWidth',3,'Color',[1, .3 0])
12  hold on
```

```
13  grid on
14  ylim([0,4])
15  axis square
16  fig=gcf;
17  set(findall(fig,'-property','FontSize'),'FontSize',14)
```



```
1   clear all
2   close all
3   clc
4   format short eng
5
6   t=-8:.01:8;
7   x=(-1*(t+4)).*(u(t+8)-u(t+4))+(-t).*(u(t+4)-u(t))+(-t+4).*(u(t)-u(t-4))+(-t
        +8).*(u(t-4)-u(t-8));
8
9   figure(1)
10  plot(t,x,'LineWidth',3,'Color',[1, .3 0])
11  hold on
12  grid on
13  ylim([0,4])
14  xlim([-8,8])
15  fig=gcf;
16  set(findall(fig,'-property','FontSize'),'FontSize',14)
```

```
1   clear all
2   close all
3   clc
4   format short eng
5
6   t=-8:.01:8;
7   x=(-t-4)+4*u(t+4)+4*u(t)+4*u(t-4);
8
9   figure(1)
10  plot(t,x,'LineWidth',3,'Color',[1, .3 0])
```
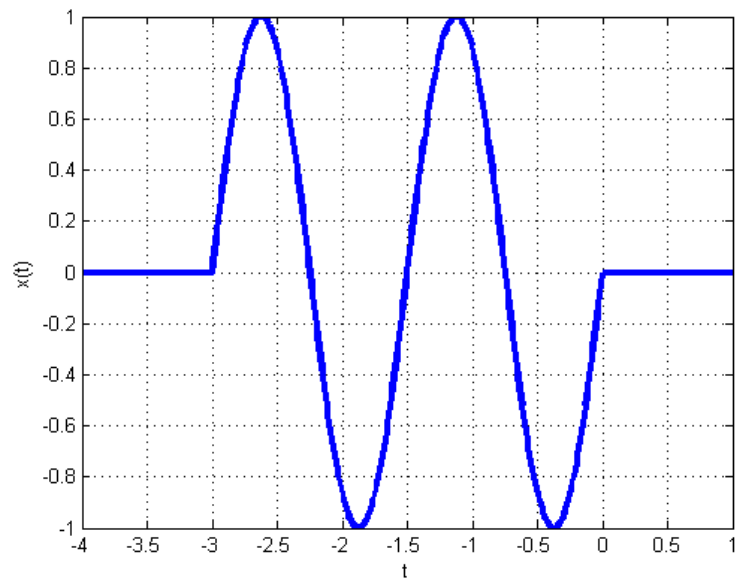
```
11  hold on
12  grid on
13  ylim([0,4])
14  xlim([-8,8])
15  fig=gcf;
16  set(findall(fig,'-property','FontSize'),'FontSize',14)
```

```
1   clear all
2   close all
3   clc
4   format short eng
5
6   t=-8:.01:8;
7   x=-1*r(t+8)+4+4*u(t+4)+4*u(t)+4*u(t-4);
8
9   figure(1)
10  plot(t,x,'LineWidth',3,'Color',[1, .3 0])
11  hold on
12  grid on
13  ylim([0,4])
14  xlim([-8,8])
15  fig=gcf;
16  set(findall(fig,'-property','FontSize'),'FontSize',14)
```
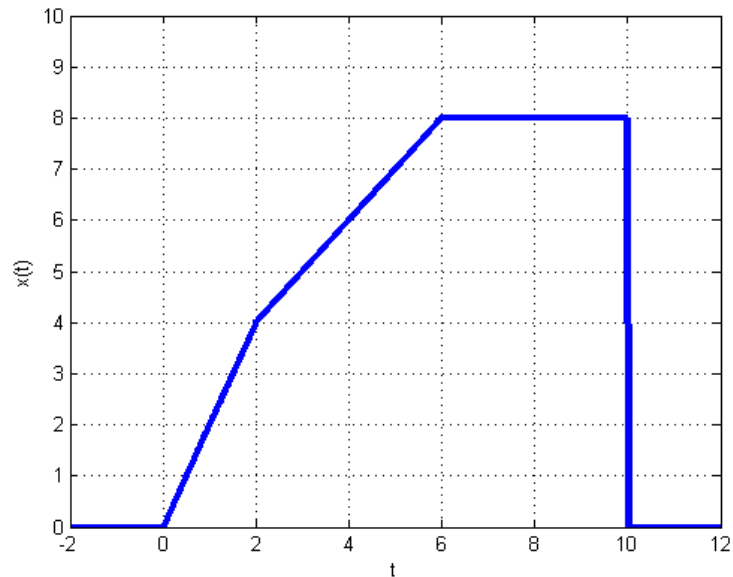


```
1   clear all
2   close all
3   clc
4   format short eng
5
6   t=-4:.01:1;
7   x=sin(((4*pi)/3).*t).*(u(t+3)-u(t));
8
9   figure(1)
10  plot(t,x,'LineWidth',3,'Color',[1, .3 0])
```

```
11  hold on
12  grid on
13  ylim([-1,1])
14  fig=gcf;
15  set(findall(fig,'-property','FontSize'),'FontSize',14)
```



```
1   clear all
2   close all
3   clc
4   format short eng
5
6   t=-2:.01:12;
7   x=(2.*t).*(u(t)-u(t-2))+(t+2).*(u(t-2)-u(t-6))+(8).*(u(t-6)-u(t-10));
8
9   figure(1)
10  plot(t,x,'LineWidth',3,'Color',[1, .3 0])
11  hold on
12  grid on
13  xlim([-2,12])
14  ylim([0,10])
15  fig=gcf;
16  set(findall(fig,'-property','FontSize'),'FontSize',14)
```

```
1   clear all
2   close all
3   clc
4   format short eng
5
6   t=-2:.01:12;
7   x=2*r(t)-r(t-2)-r(t-6)-8*u(t-10);
8
9   figure(1)
10  plot(t,x,'LineWidth',3,'Color',[1, .3 0])
11  hold on
```

```matlab
12  grid on
13  xlim([-2,12])
14  ylim([0,10])
15  fig=gcf;
16  set(findall(fig,'-property','FontSize'),'FontSize',14)
```