

```

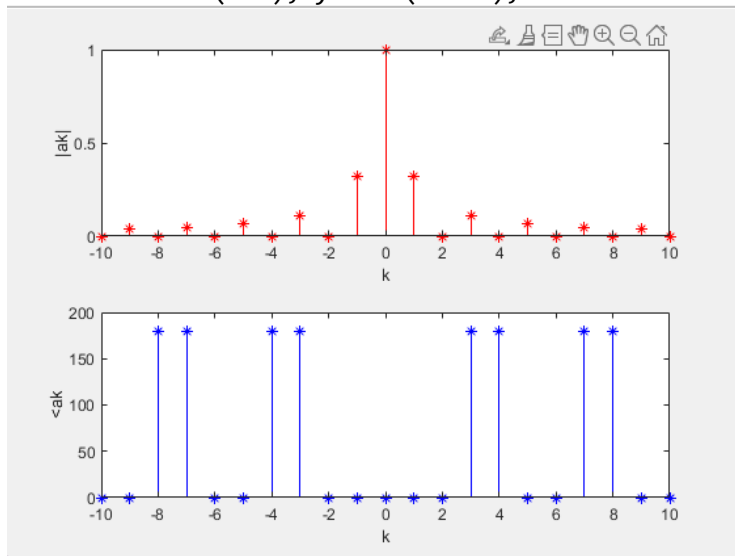
% 1b

phi = 0;
T0 = 4;
w = (2*pi/T0);
a0 = 1;
kmax = 10;
ak = zeros(2*kmax+1,1);
n = 1;

figure
for k= -kmax:kmax
    if (k == 0)
        ak(n,1) = a0;
    else
        ak(n,1) = sin(k*w)/(k*pi);
    end
    n = n + 1;
end

subplot(2,1,1)
stem(-kmax:kmax,abs(ak),'r*')
xlabel('k'); ylabel('|ak|');
subplot(2,1,2)
stem(-kmax:kmax,angle(ak)*(180/pi),'b*')
xlabel('k'); ylabel('<ak');

```



```

% 1c even so no bk coeff
t = [-2:.05:2]';
n = 1;
x_t = 0;
for k = -kmax:kmax
    x_t = x_t + ak(n)*exp(1*j*k*w*t);
    n = n+1;
end
figure
subplot(2,1,1)

```

```
plot(t,real(x_t))
xlabel('t (s)'); ylabel('x(t)'); grid on;
```

```
t = [-6:.05:6]';
n = 1;
x_t = 0;
for k = -kmax:kmax
    x_t = x_t + ak(n)*exp(1*j*k*w*t);
    n = n+1;
end
```

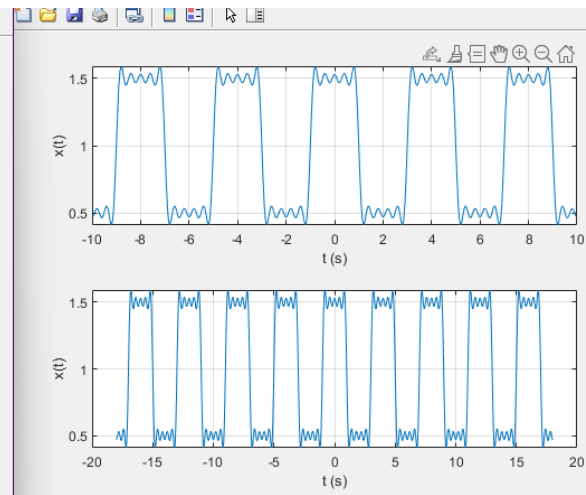
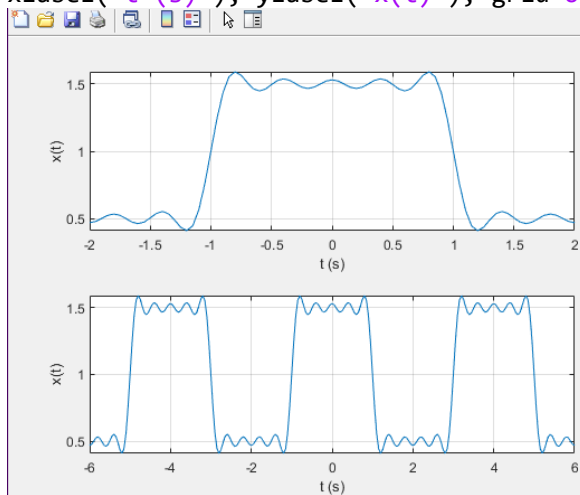
```
subplot(2,1,2)
plot(t,real(x_t))
xlabel('t (s)'); ylabel('x(t)'); grid on
```

```
t = [-10:.05:10]';
n = 1;
x_t = 0;
for k = -kmax:kmax
    x_t = x_t + ak(n)*exp(1*j*k*w*t);
    n = n+1;
end
```

```
figure
subplot(2,1,1)
plot(t,real(x_t))
xlabel('t (s)'); ylabel('x(t)'); grid on
```

```
t = [-18:.05:18]';
n = 1;
x_t = 0;
for k = -kmax:kmax
    x_t = x_t + ak(n)*exp(1*j*k*w*t);
    n = n+1;
end
```

```
subplot(2,1,2)
plot(t,real(x_t))
xlabel('t (s)'); ylabel('x(t)'); grid on
```

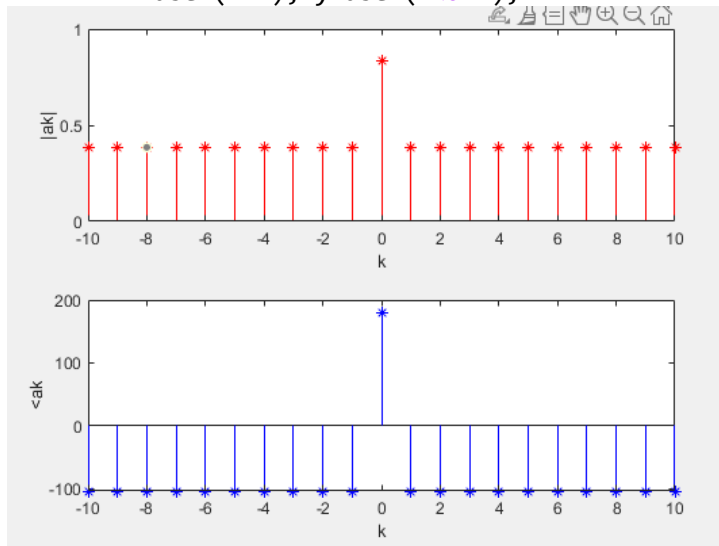


```
%% 2b
```

```
phi = 0;
T0 = 3;
w = (2*pi/T0);
a0 = -5/6;
kmax = 10;
ak = zeros(2*kmax+1,1);
n = 1;

figure
for k= -kmax:kmax
    if (k == 0)
        ak(n,1) = a0;
    else
        ak(n,1) = (exp(-j*8*pi/3)-3*exp(-j*2*pi/3))/(j*2*pi)-...
            (3-3*exp(-j*8*pi/3))/(16*pi^2)+(9*exp(-j*2*pi/3)-9)/(4*pi^2);
    end
    n = n + 1;
end

subplot(2,1,1)
stem(-kmax:kmax,abs(ak),'r*')
xlabel('k'); ylabel('|ak|');
subplot(2,1,2)
stem(-kmax:kmax,angle(ak)*(180/pi),'b*')
xlabel('k'); ylabel('<ak');
```



```
% 2c
```

```
% ak
```

```
t = [-3:.05:3]';
n = 1;
x_t = 0;
for k = -kmax:kmax
```

```

        x_t = x_t + ak(n)*exp(1*j*k*w*t);
        n = n+1;
end

figure
subplot(3,1,1)
plot(t,real(x_t))
xlabel('t (s)'); ylabel('x(t)'); grid on
% bk
n = 1;
for k = -kmax:kmax
    bk(n,1) = ak(n,1)*(exp(j*k*w*2) - 2*exp(-j*k*w));
    n = n + 1;
end

t = [-3:.05:3]';
n=1;
zt = 0;
for k = -kmax:1:kmax
    zt = zt + bk(n)*exp(j*k*w*t);
    n = n+1;
end
subplot(3,1,2)
plot(t,real(zt))
xlabel('t'); ylabel('z(t)'); grid on

t = [-6:.05:6]';
n=1;
zt = 0;
for k = -kmax:1:kmax
    zt = zt + bk(n)*exp(j*k*w*t);
    n = n+1;
end
subplot(3,1,3)
plot(t,real(zt))
xlabel('t'); ylabel('z(t)'); grid on

figure
t = [-12:.05:12]';
n=1;
zt = 0;
for k = -kmax:1:kmax
    zt = zt + bk(n)*exp(j*k*w*t);
    n = n+1;
end
subplot(2,1,1)
plot(t,real(zt))
xlabel('t'); ylabel('z(t)'); grid on

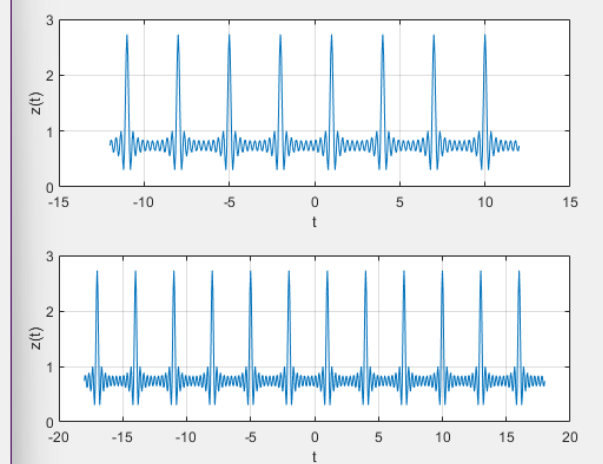
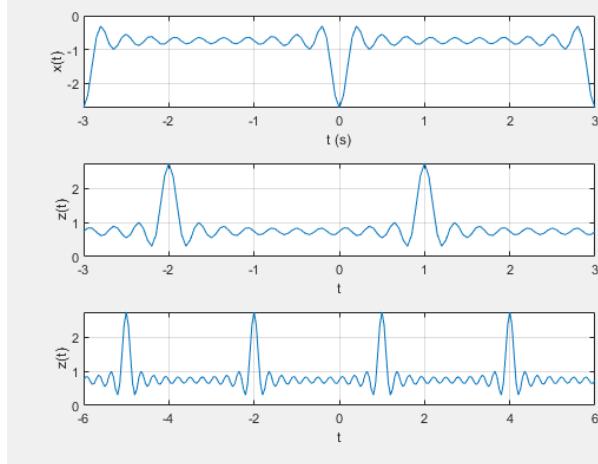
t = [-18:.05:18]';
n=1;
zt = 0;
for k = -kmax:1:kmax
    zt = zt + bk(n)*exp(j*k*w*t);
    n = n+1;
end

```

```

end
subplot(2,1,2)
plot(t,real(zt))
xlabel('t'); ylabel('z(t)'); grid on

```



```

%% 3b

```

```

t0 = 2;
w = pi;
kmax = 10;
bk = zeros(2*kmax+1,1);
n = 1;

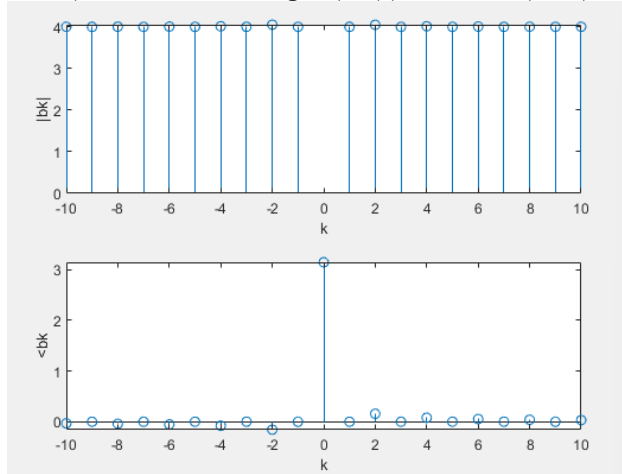
for k = -kmax:kmax
    bk(n,1) = 4 - (2*exp(-j*2*w*k)/(j*k*w) + (2*exp(-j*w*k))/(j*w*k));
    n = n + 1;
end

```

```

figure
subplot(2,1,1)
stem(-kmax:kmax, abs(bk)), xlabel('k'), ylabel('|bk|')
subplot(2,1,2)
stem(-kmax:kmax, angle(bk)), xlabel('k'), ylabel('<bk')

```



```

bk_rev = flipud(bk);
t = -2:.05:2';
n = 1;
zt = 0;
for k = -kmax:kmax
    zt = bk(n)*exp(j*k*w*t) + bk_rev(n)*exp(j*k*w*t);
    n = n + 1;
end

figure
plot(t,real(zt)); xlabel('t'); ylabel('z(t)'); grid on

```

