

DSAA Computer Assignment-3

Section – 1 Analysis and Synthesis

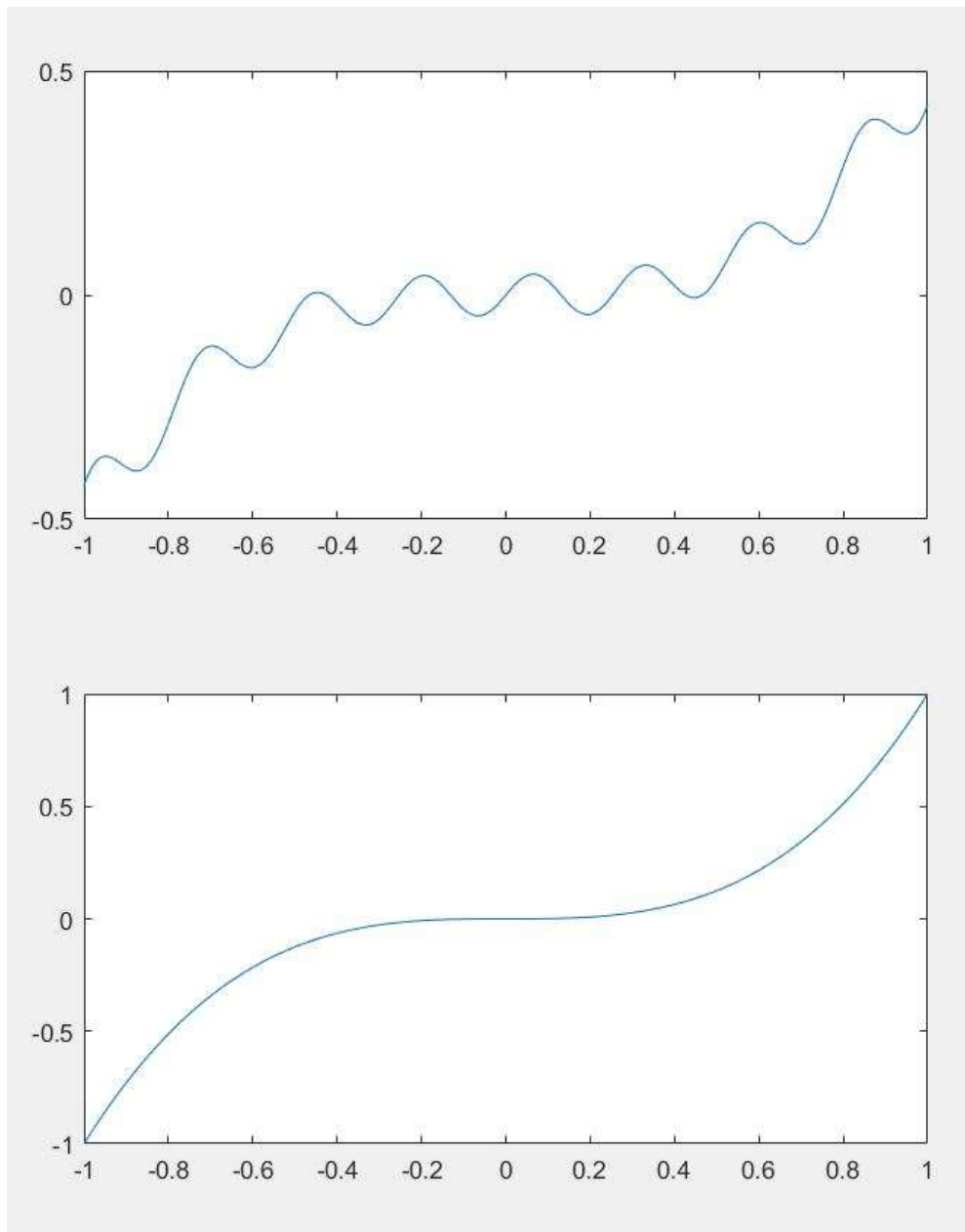
Question 1a

```
syms k
t = -1:0.01:1;
T = 3;
w = (2*pi)/T;
x = t.*t.*t;
a0 = (1/T)*int((k*k*k), [-T/2 T/2]);
prompt = 'Enter no values to be chosen ';
N = input(prompt);
y = zeros(size(t));
y = y + a0;
r = 1:N;
for i=1:N
    a(i) = (1/T)*int((k*k*k*cos(w*i*k)), [-T/2 T/2]);
    b(i) = (1/T)*int((k*k*k*sin(w*i*k)), [-T/2 T/2]);
    y = y + (a(i)*cos(i*w*t)) + (b(i)*sin(i*w*t));
end

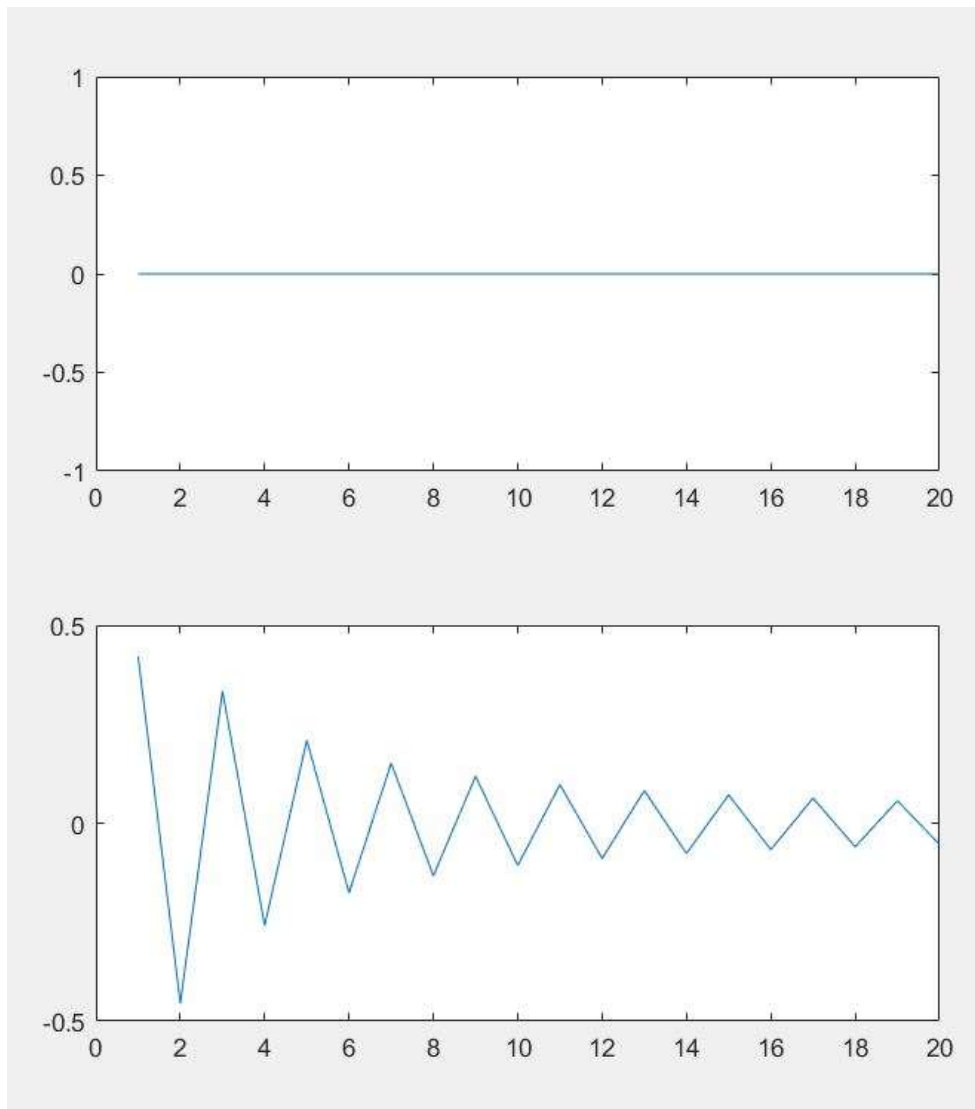
subplot(211);
plot(t, y);
subplot(212);
plot(t, x);
```

In the graph below, the upper one represents the reconstructed signal while the lower one denotes the original signal

Plotted at N=20



```
subplot(211);  
plot(r, a);  
subplot(212);  
plot(r, b);
```



Question 1b

```
syms k
t = -1:0.01:1;
T = 3;
w = (2*pi)/T;
x = 2*abs(t);

a0 = (1/T)*(int(2*abs(k), [-T/2 T/2]));
prompt = 'Enter no values to be chosen ';
N = input(prompt);
y = zeros(size(t));
y = y + a0;
r = 1:N;
for i=1:N
    a(i) = (1/T)*int((2*abs(k)*cos(w*i*k)), [-T/2 T/2]);
    b(i) = (1/T)*int((2*abs(k)*sin(w*i*k)), [-T/2 T/2]);
```

```

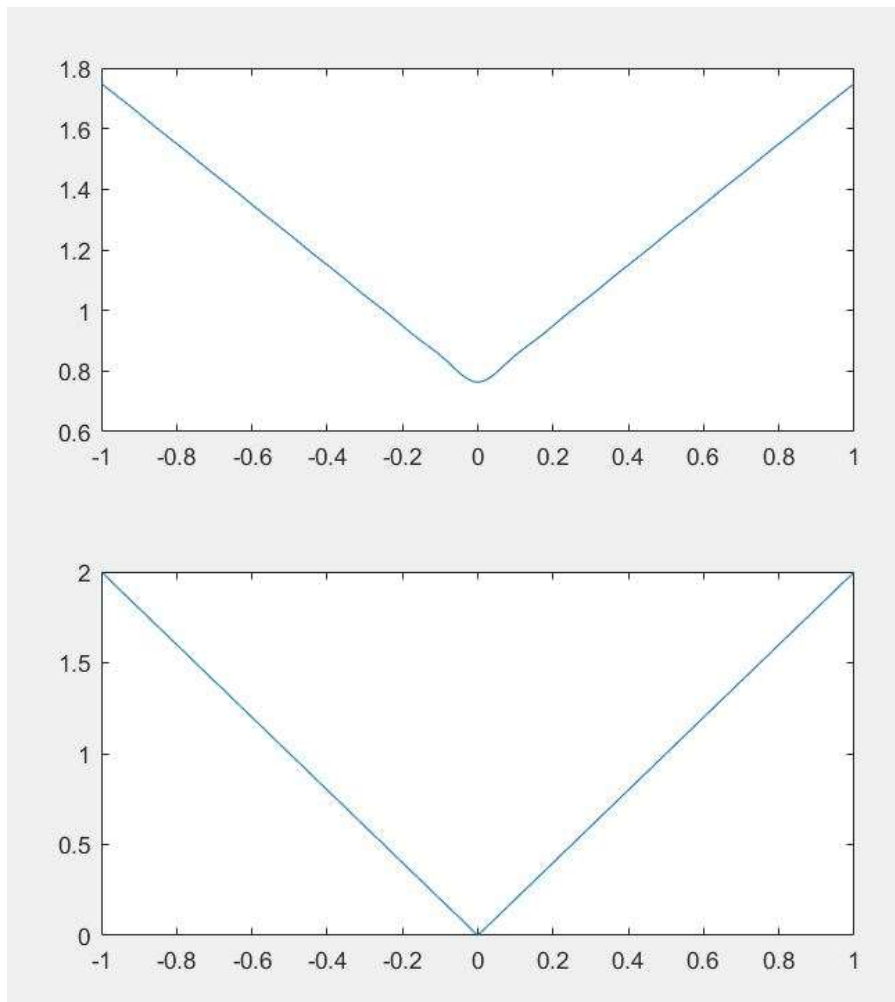
        y = y + (a(i)*cos(i*w*t)) + (b(i)*sin(i*w*t));
end

subplot(211);
plot(t, y);
subplot(212);
plot(t, x);

```

In the graph below, the upper one represents the reconstructed signal while the lower one denotes the original signal

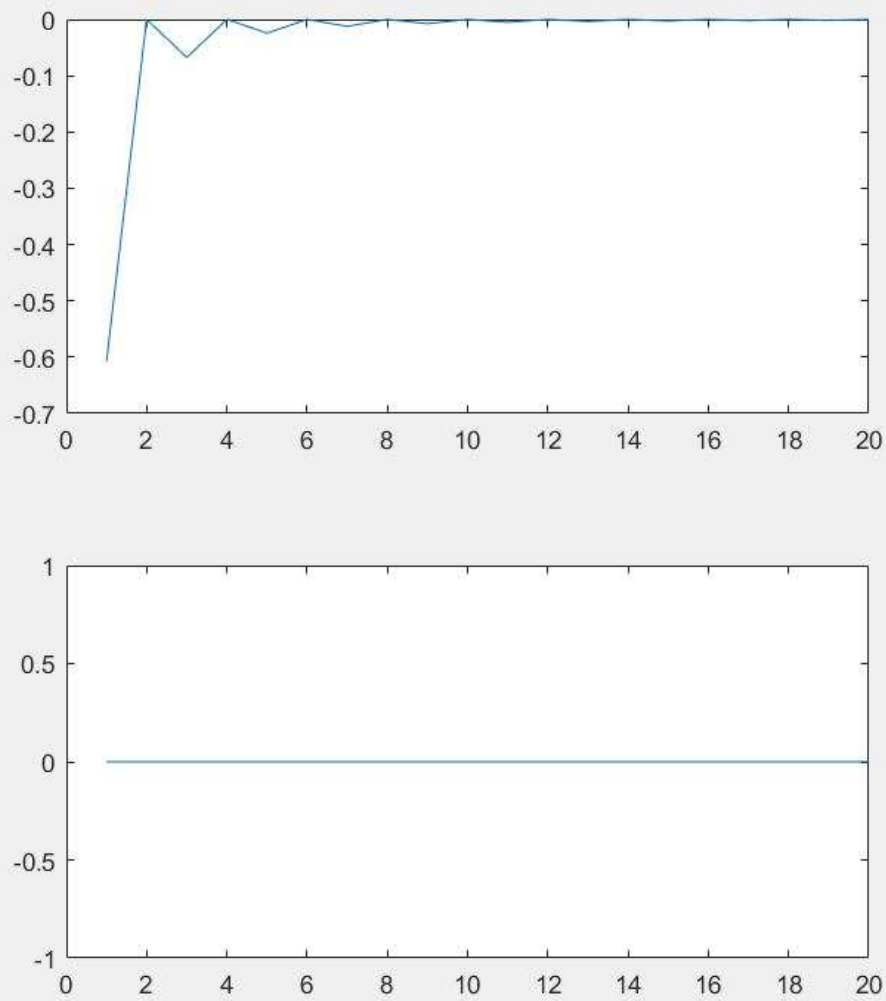
Plotted at N=20



```

subplot(211);
plot(r, a);
subplot(212);
plot(r, b);

```



Question 1c

```

syms k
t = -1:0.01:1;
T = 3;
w = (2*pi)/T;
x = exp(-2*abs(t));

a0 = (1/T)*int(exp(-2*abs(k)), [-T/2 T/2]);
prompt = 'Enter no values to be chosen ';
N = input(prompt);

y = zeros(size(t));
y = y + a0;
r = 1:N;
for i=1:N
    a(i) = (1/T)*int((exp(-2*abs(k))*cos(w*i*k)), [-T/2
T/2]);

```

```

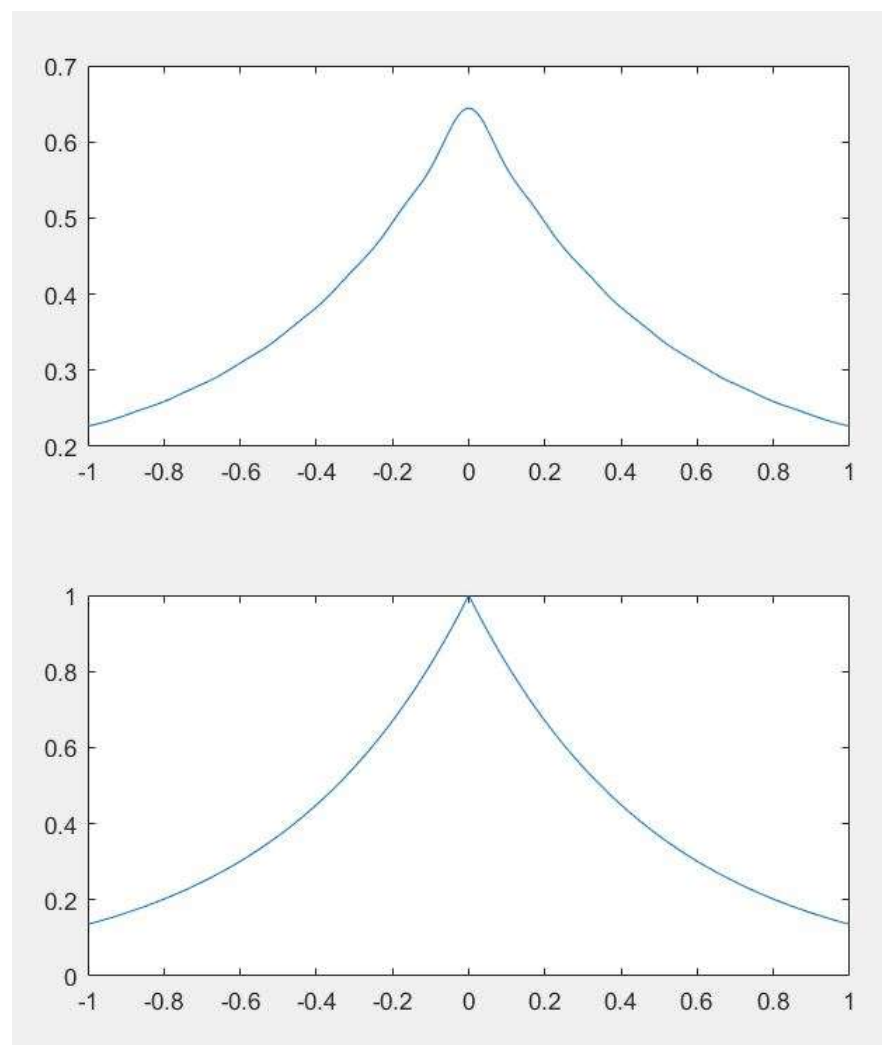
    b(i) = (1/T)*int((exp(-2*abs(k))*sin(w*i*k)), [-T/2
T/2]);
    y = y + (a(i)*cos(i*w*t)) + (b(i)*sin(i*w*t));
end

subplot(211);
plot(t, y);
subplot(212);
plot(t, x);

```

In the graph below, the upper one represents the reconstructed signal while the lower one denotes the original signal

Plotted at N=20

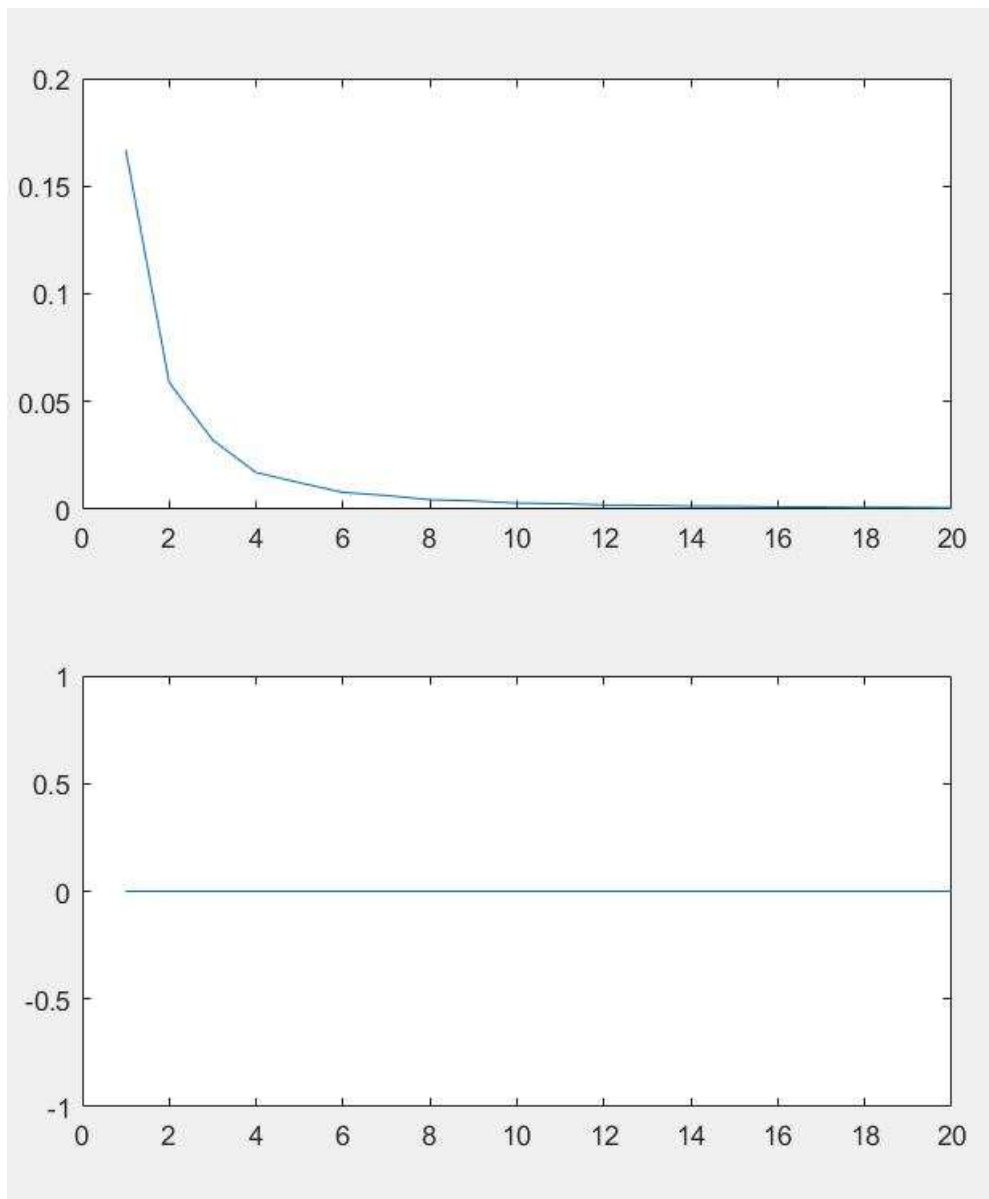


```

subplot(211);
plot(r, a);

```

```
subplot(212);
plot(r, b);
```



Section – 2 Convergence

Question 2a function

It is similar to first one in the sequence but now it is represented as function now without a fixed parameter 'N' but was arbitrarily passed from function call

```
function c = fun1(N)
    syms k
    t = -1:0.01:1;
    T = 3;
    w = (2*pi)/T;
```

```

x = t.*t.*t;
a0 = (1/T)*int((k*k*k), [-T/2 T/2]);
y = zeros(size(t));
y = y + a0;
for i=1:N+1
    a(i) = (1/T)*int((k*k*k*cos(w*i*k)), [-T/2 T/2]);
    b(i) = (1/T)*int((k*k*k*sin(w*i*k)), [-T/2 T/2]);
    y = y + (a(i)*cos(i*w*t)) + (b(i)*sin(i*w*t));
end
d = zeros(size(20));
c = 0;
for i = 1:20
    d(i) = abs(x(i*10-1) - y(i*10-1));
    c = c + d(i);
end
end

```

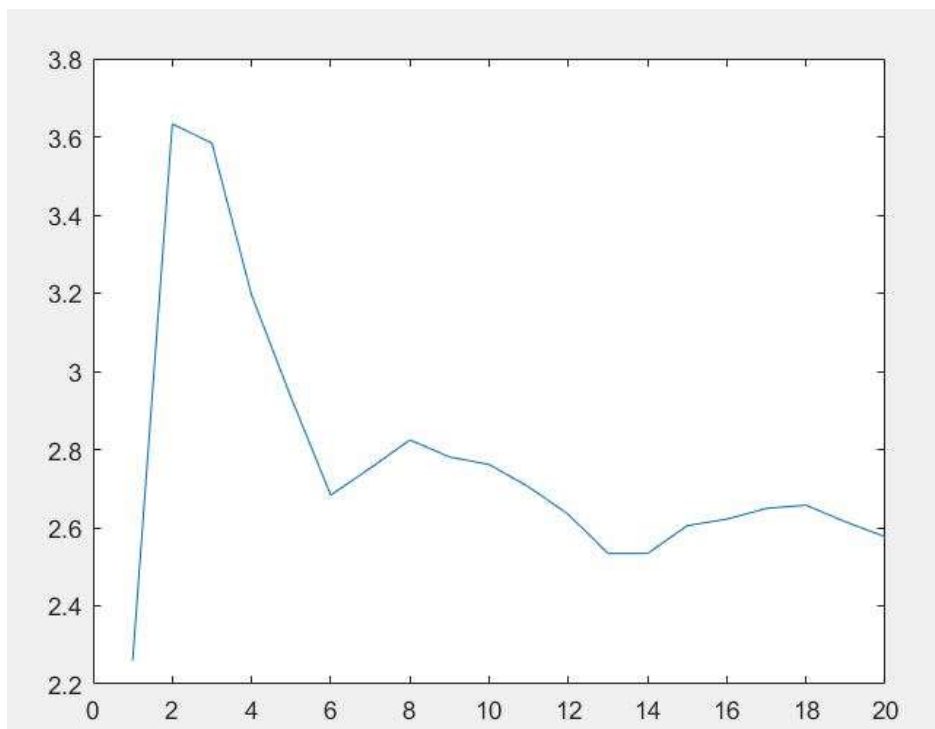
Question 2a

```

t = 1:20;
f = zeros(size(t));
for i = 1:20
    f(i) = fun1(i);
end
plot(t, f);

```

Values taken upto 20 numbers



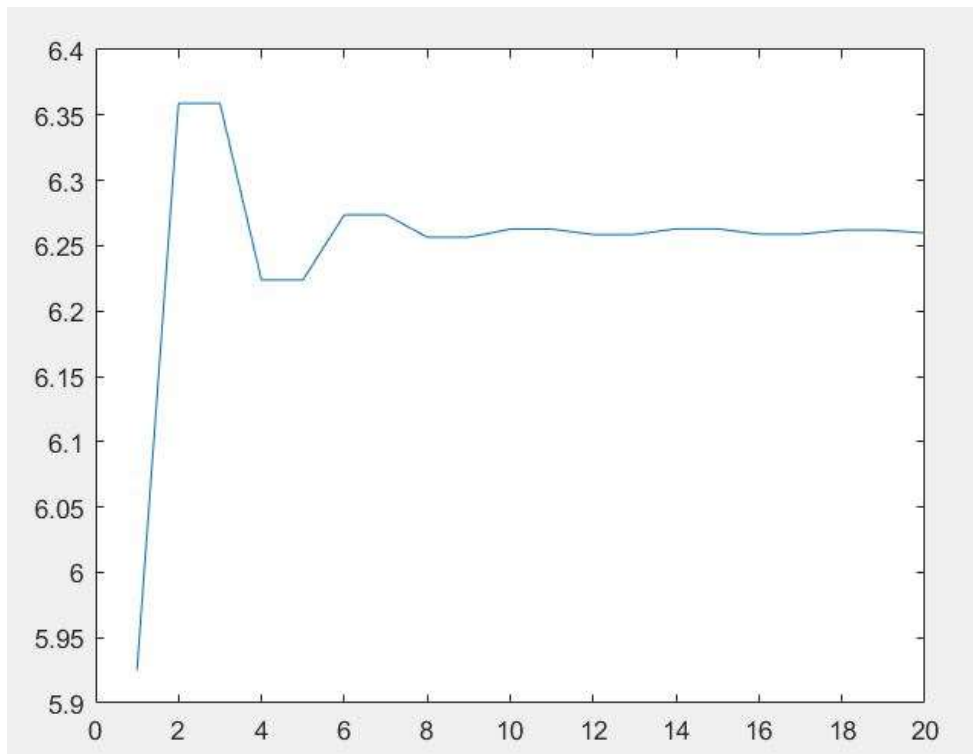
Question 2b function

```
function c = fun2(N)
    syms k
    t = -1:0.01:1;
    T = 3;
    w = (2*pi)/T;
    x = 2*abs(t);
    a0 = (1/T)*int(2*abs(k), [-T/2 T/2]);
    y = zeros(size(t));
    y = y + a0;
    for i=1:N+1
        a(i) = (1/T)*int((2*abs(k)*cos(w*i*k)), [-T/2
T/2]);
        b(i) = (1/T)*int((2*abs(k)*sin(w*i*k)), [-T/2
T/2]);
        y = y + (a(i)*cos(i*w*t)) + (b(i)*sin(i*w*t));
    end
    d = zeros(size(20));
    c = 0;
    for i = 1:20
        d(i) = abs(x(i*10-1) - y(i*10-1));
        c = c + d(i);
    end
end
```

Question 2b

```
t = 1:20;
f = zeros(size(t));
for i = 1:20
    f(i) = fun2(i);
end
plot(t, f);
```

Values taken upto 20 numbers



Question 2c function

```
function c = fun3(N)
    syms k
    t = -1:0.01:1;
    T = 3;
    w = (2*pi)/T;
    x = exp(-2*abs(t));
    a0 = (1/T)*int(exp(-2*abs(k)), [-T/2 T/2]);
    y = zeros(size(t));
    y = y + a0;
    for i=1:N+1
        a(i) = (1/T)*int((exp(-2*abs(k))*cos(w*i*k)), [-
T/2 T/2]);
        b(i) = (1/T)*int((exp(-2*abs(k))*sin(w*i*k)), [-
T/2 T/2]);
        y = y + (a(i)*cos(i*w*t)) + (b(i)*sin(i*w*t));
    end
    d = zeros(size(20));
    c = 0;
    for i = 1:20
        d(i) = abs(x(i*10-1) - y(i*10-1));
        c = c + d(i);
    end
end
```

Question 2c

```
t = 1:20;  
f = zeros(size(t));  
for i = 1:20  
    f(i) = fun3(i);  
end  
plot(t, f);
```

Values taken upto 20 numbers

