Q)Compress ECG signal data using DCT. Find out the coefficients and find how many coefficients represent 98% of the data.

ECG data

```
clear;
close all;
clc;
load('Subject00_1_edfm.mat');
a=val;
T=1;
fs=1000;
N=length(a);
ts=1/fs;
t=(0:N-1)*ts;
```

DCT of the signal

```
dct_Sig=dct(a);
%disp('Coefficients in the original signal');
%disp(dct_Sig);
```

Sorting in descending order

```
[XX,ind] = sort(abs(dct_Sig),'descend');
```

98% of energy in the signal

```
need = 1;
while norm(dct_Sig(ind(1:need)))/norm(dct_Sig)<0.98
   need = need+1;
end
c_r=N/need;
disp('compression ratio=');
```

```
compression ratio=
```

```
disp(c_r);
```

```
   19.3798
```

Make other values 0

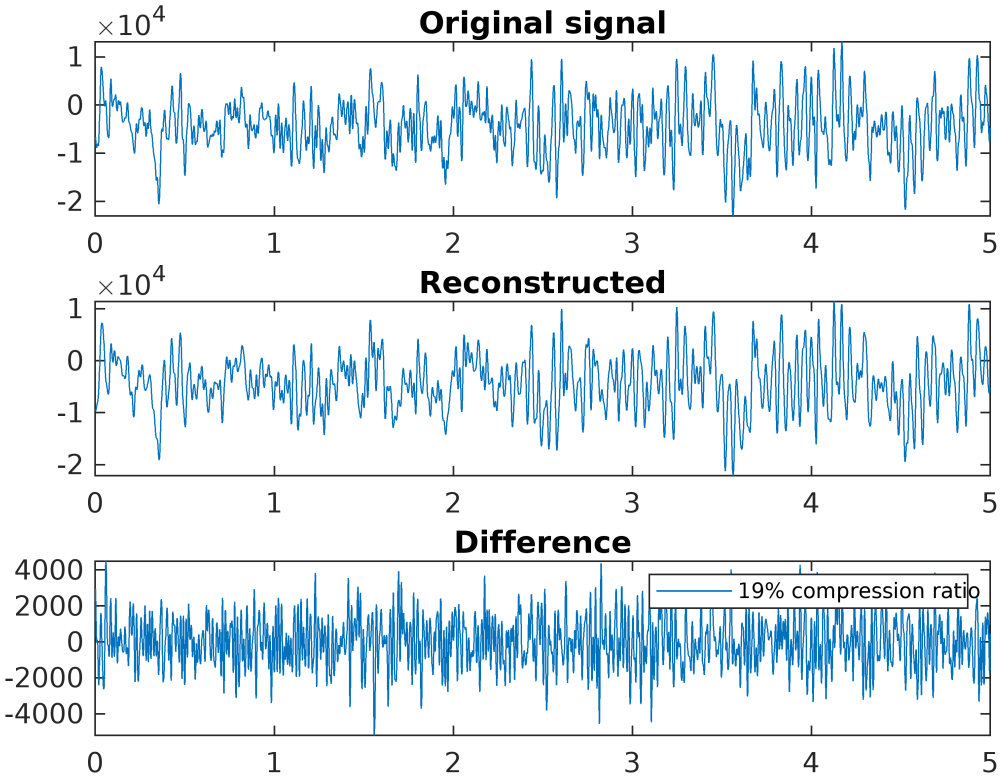
```
dct_Sig(ind(need+1:end)) = 0;
```

Perform IDCT

```
xx = idct(dct_Sig);
%disp('Coefficients in the reconstructed signal');
%disp(xx);
```

Plots

```
subplot(3,1,1);
plot(t,a);
title('Original signal');
subplot(3,1,2);
plot(t,xx);
title('Reconstructed');
subplot(3,1,3);
plot(t,a-xx);
title('Difference');
legend([int2str(c_r) '% compression ratio']);
```



Energy

```
Eo=(norm(a));
disp('Energy of original signal=');
```

```
Energy of original signal=
```

```
disp(Eo);
```

```
    4.8983e+05
```

```
Er=(norm(xx));
disp('Energy of reconstructed signal=');
```

```
Energy of reconstructed signal=
```

```
disp(Er);
```

```
    4.8010e+05
```

Percentage

```
per=(Er/Eo)*100;
disp('Percentage of energy in reconstructed=');
```

```
Percentage of energy in reconstructed=
```

```
disp(per);
```

```
    98.0131
```

Comparison

```
save('new.mat','xx');
disp('comparison');
```

```
comparison
```

```
z=dir('new.mat');
k=dir('Subject00_1_edfm.mat');
disp(k);
```

```
       name: 'Subject00_1_edfm.mat'
     folder: '/MATLAB Drive'
       date: '24-Jun-2022 00:18:47'
      bytes: 191072
      isdir: 0
    datenum: 7.3870e+05
```

```
disp(z);
```

```
       name: 'new.mat'
     folder: '/MATLAB Drive'
       date: '24-Jun-2022 00:47:44'
      bytes: 38416
      isdir: 0
    datenum: 7.3870e+05
```