```
 1: #!/usr/bin/python
 2: import numpy as np
 3: import pylab
 4:
 5: def dct(y):
 6:     N = len(y)
 7:     y2 = np.empty(2*N,float)
 8:     y2[:N] = y[:]
 9:     y2[N:] = y[::-1]
10:
11:     c = np.fft.rfft(y2)
12:     phi = np.exp(-1j*np.pi*np.arange(N)/(2*N))
13:     return np.real(phi*c[:N])
14:
15: def idct(a):
16:     N = len(a)
17:     c = np.empty(N+1,complex)
18:
19:     phi = np.exp(1j*np.pi*np.arange(N)/(2*N))
20:     c[:N] = phi*a
21:     c[N] = 0.0
22:     return np.fft.irfft(c)[:N]
23:
24: def part_a():
25:     data = np.loadtxt('dow2.txt')
26:     fft = np.fft.rfft(data)
27:     fft[int(len(fft)*0.02):] = [0] * (len(fft) - int(len(fft)*0.02))
28:     new_data = np.fft.irfft(fft)
29:     pylab.plot(data)
30:     pylab.plot(new_data)
31:     pylab.show()
32:
33: def part_b():
34:     data = np.loadtxt('dow2.txt')
35:     fft = dct(data)
36:     fft[int(len(fft)*0.02):] = [0] * (len(fft) - int(len(fft)*0.02))
37:     new_data = idct(fft)
38:     pylab.plot(data)
39:     pylab.plot(new_data)
40:     pylab.show()
41:
42: def main():
43:     part_a()
44:     part_b()
45:
46: if __name__ == "__main__":
47:     main()
```