

Zewail City of Science and Technology
University of Science and Technology
CIE 327 - Probability and Stochastic Processes

Project Report Part II

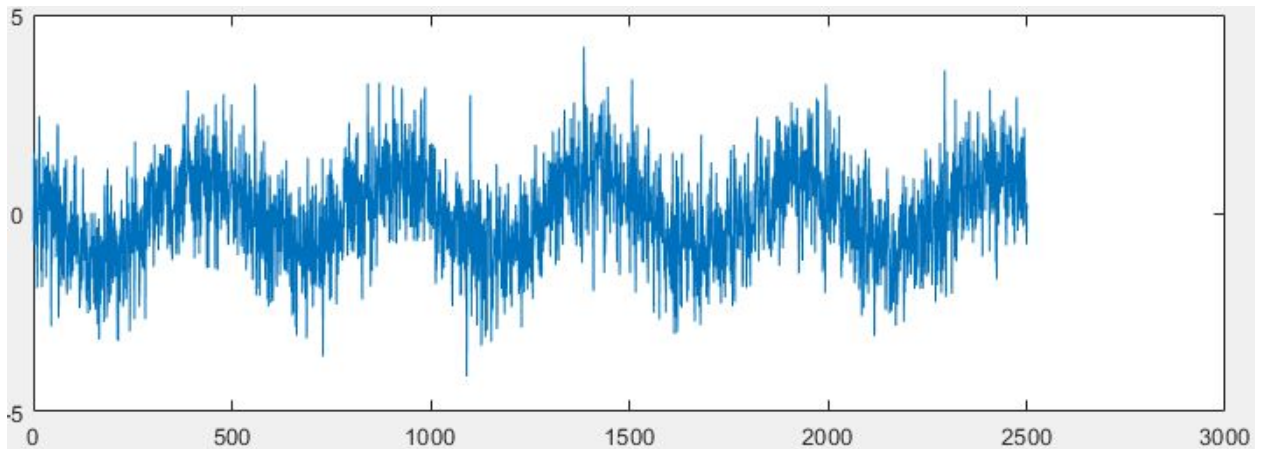
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Part II

(1) The Matlab Code:

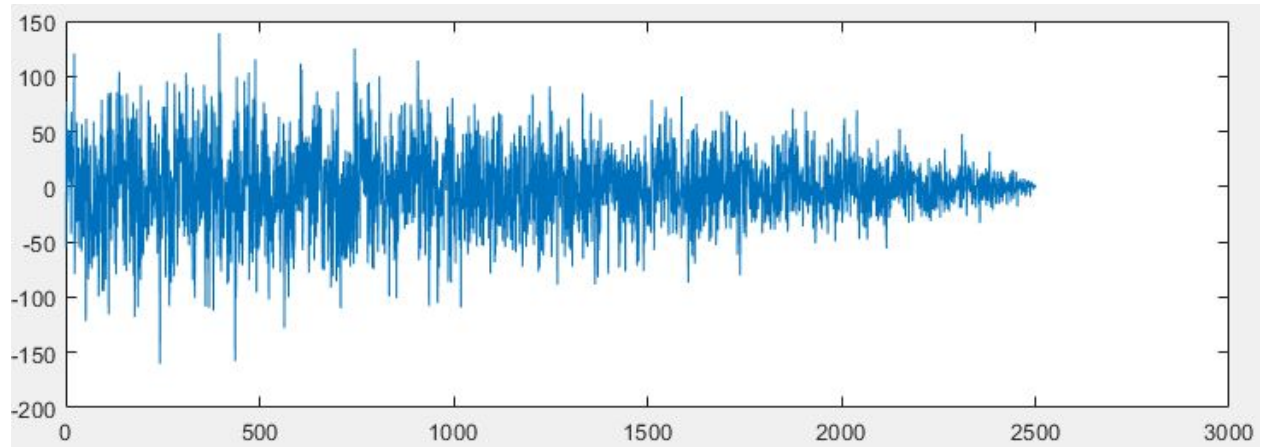
```
%% Probability Project Part II
t = 0:0.001:5;
X = cos(2*pi*t + pi/3);
N = normrnd(0,1,[1,length(X)]);
Y = X+N;
plot(Y);
rN=size(N,1); cN=size(N,2);
%% To get the ACF of N(t)
N_ACF = time_acf(N,1);
plot(N_ACF);
%% To get the ACF of Y(t)
Y_ACF = time_acf(Y,1);
plot(Y_ACF);
```

(2) Plot of Y(t):

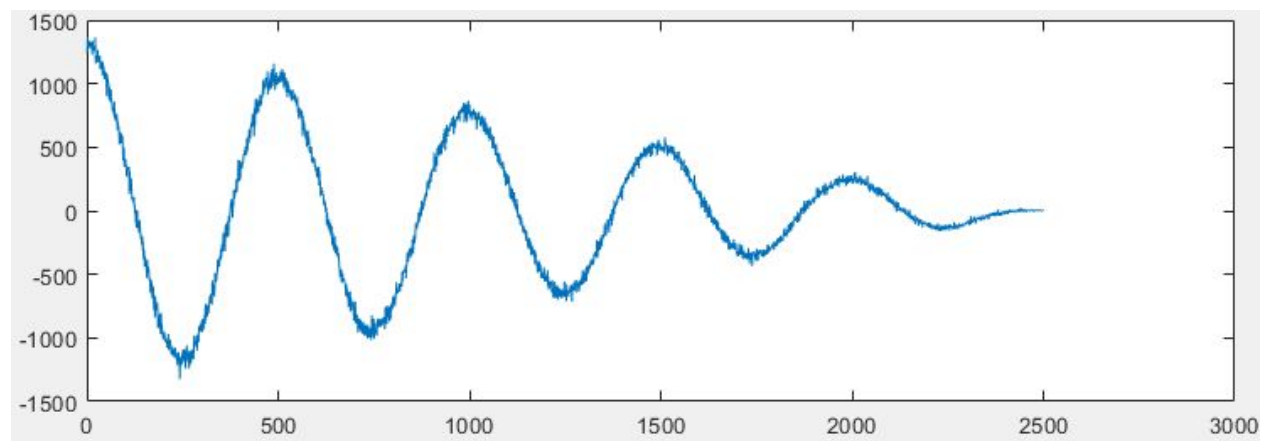


***Yes,** because $Y(t)$ is simply $X(t)$ with added noise, so it should have the same periodicity. Noise do not make changes to the noise.*

(3) Plot of ACF of $N(t)$:



(4) Plot of ACF of $Y(t)$:



** The points (5) and (6) is mainly dependent on searching online in Matlab documentation :

<https://www.mathworks.com/help/signal/ref/findpeaks.html>

(5) To get the period of $Y(t)$

```
function result = Yperiod (Y)
Y_ACF = time_acf(Y,1);
[a,b] = findpeaks(Y_ACF);
result= mean(diff(b)); %the difference between the peaks gives us the period.
end
```

(6) To get the period of any periodic $X(t)$

```
function result = get_the_period (X)
% X is periodic signal
N = normrnd(0,1,[1,length(X)]);
Y = X+N;
Y_ACF = time_acf(Y,1);
[a,b] = findpeaks(Y_ACF);
result= mean(diff(b));
end
```