

HW 3

จากสัญญาณความถี่ 10 ชุด ชุดละ 201 times มีข้อมูลอย่างย่อดังนี้

	t	f(t)1	f(t)2	f(t)3	f(t)4	f(t)5	f(t)6	f(t)7	f(t)8	f(t)9	f(t)10
1	0	0	0	0	0	0	0	0	0	0	0
2	0.05	8.314748	9.943027	10.24289	12.50811	12.23409	11.41024	11.97037	6.005756	4.680229	6.036015
3	0.1	16.46803	13.49537	19.12911	11.49106	6.348377	18.75102	8.4546	19.10372	19.89303	15.03556
4	0.15	23.98499	26.30057	23.44397	20.12056	31.23837	23.63575	27.01097	25.21109	24.81158	22.54558
5	0.2	31.32743	30.16507	30.48398	19.44425	23.8522	21.59472	24.41306	25.90786	29.48539	36.30905
6	0.25	37.44878	32.56993	26.23707	16.30675	28.46381	30.25185	35.32009	32.88095	26.86991	27.96027
7	0.3	38.06364	36.48559	36.36179	36.8301	32.70342	30.88371	29.99576	37.49776	14.58361	28.54767
8	0.35	36.22398	20.31643	27.99438	46.4148	35.16277	27.85935	28.76389	26.51179	27.34534	24.46673
9	0.4	19.41874	12.7805	15.32985	28.11301	34.90011	27.6282	10.02161	27.51245	18.04847	30.78653
10	0.45	19.96076	9.99711	15.77412	13.69258	16.36662	30.66539	20.51602	21.7433	15.57801	10.10326
11	0.5	19.7431	14.66127	25.02091	12.95903	4.08529	12.63988	12.62082	17.08736	8.343431	18.6096
12	0.55	13.74381	6.598893	16.76832	10.07252	6.104015	3.603047	12.40304	6.049507	18.4163	10.58521
13	0.6	2.267711	-4.53024	4.802096	-7.57524	-0.3976	1.8944	-2.24601	-4.21548	7.938177	3.882329
14	0.65	2.490328	3.740045	5.886138	5.035502	13.85476	-9.30677	10.30996	6.242089	0.553654	6.741252
15	0.7	-14.9024	3.863469	5.067274	-2.12086	-2.28331	5.089617	0.84863	-0.44267	6.012936	-11.0303
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192	9.55	1.354542	-1.27081	1.149155	-3.68991	2.116393	5.736848	-2.70168	3.219482	5.916182	2.678475
193	9.6	12.62278	0.780856	4.582781	4.52759	9.305107	13.44385	10.88761	-6.08385	12.84994	2.437253
194	9.65	10.06758	1.560114	3.987928	-4.81089	-9.86093	2.438269	5.767735	-6.4995	2.328093	-0.58341
195	9.7	-0.88374	5.370898	-7.05086	-6.64837	-1.30657	-6.86201	10.96418	-0.07399	-5.78462	2.897376
196	9.75	-0.99592	-4.95526	-6.79465	1.881095	-0.95019	1.078748	7.572144	7.932798	-2.42665	-5.40163
197	9.8	-0.24478	8.872279	3.215842	3.961339	-0.83218	-2.16313	-5.59707	-1.71249	-0.6129	0.175239
198	9.85	0.576776	-9.08551	5.338725	-7.85323	-6.32308	7.567651	-5.95538	-5.32152	-3.6556	-5.85481
199	9.9	3.128619	-3.80081	5.231803	-7.99087	0.919972	5.188017	-2.49735	6.661647	4.005286	2.664692
200	9.95	8.452676	-12.3014	-3.43875	-9.89019	-7.9611	7.58672	-1.36355	-3.58906	1.218851	4.296511
201	10	5.40341	-7.13777	1.484705	-11.7904	-14.523	-12.1179	-2.0375	-3.44147	-1.4228	-2.82705

จากสูตร

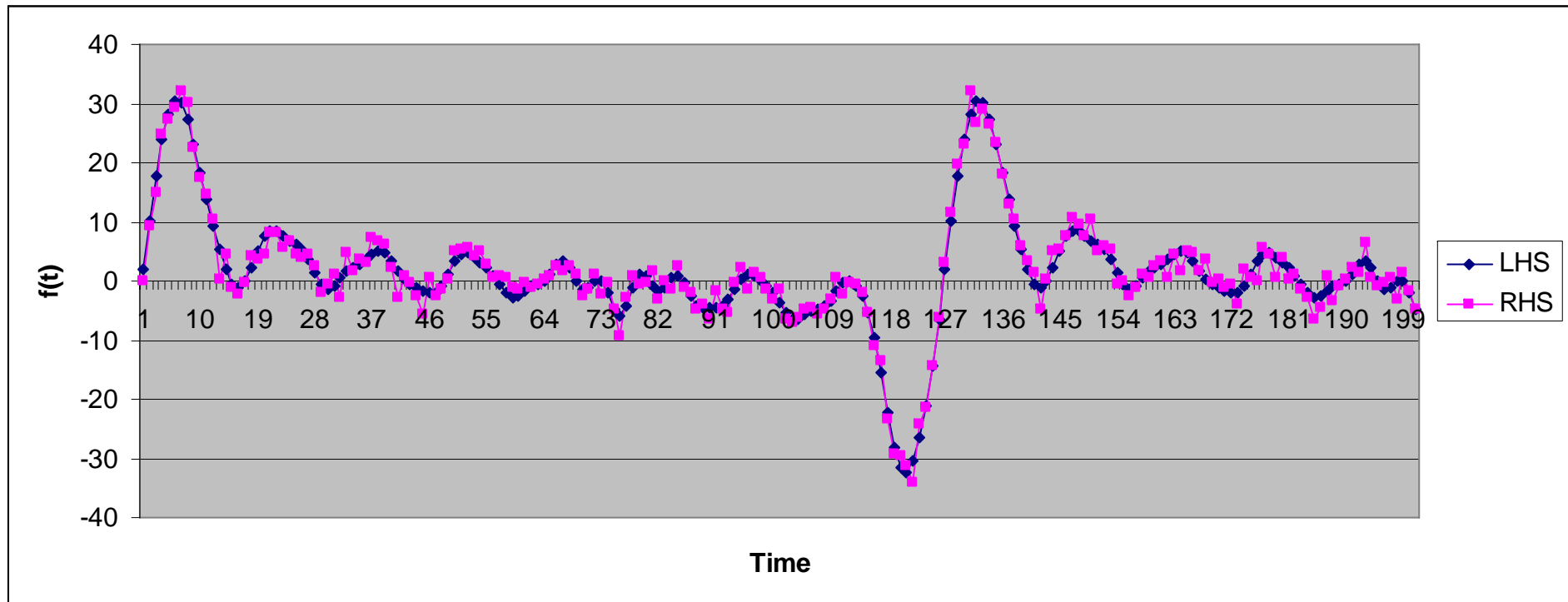
$$f(t) = a_0 + \sum_{n=0}^k \left[a_n \sin\left(\frac{2\pi nt}{T}\right) + b_n \cos\left(\frac{2\pi nt}{T}\right) \right]$$

กำหนดค่า k ที่เหมาะสม แล้วหาค่า

$$E(a_0), E(a_1), E(b_1), E(a_2), E(b_2), \dots, E(a_k), E(b_k)$$

$$\text{COV}[a_i, a_j], \forall_{i,j}$$

จากการเขียนคำสั่งในโปรแกรม **Matlab** ได้ผลดังกราฟ



ผลการคำนวณ $E(x)$ และ $COV(xx^T)$ สามารถตรวจสอบได้จาก <http://beam.to/statistics>

ตัวอย่างคำสั่งหลัก

$x1=A\backslash b$

$x2=inv(A'*A)*A'*b$

$kco=inv(A'*A)*A'*dco*A*(inv(A'*A))'$