

Chapter 3

Mathematics in daily life

Part 2

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Ch.3.2

⇒ 3.4 Convolution

⇒ 3.5 Chart and Graph

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3.4 Convolution

If one event was occurred because of doing some activities, operation of doing two things together/joint along time series this event call “convolution”.

Convolution is a mathematical operation of 2 functions , producing a third function that is typically viewed as a modified version of one of the original functions, giving the area overlap between the two functions as a function of the amount that one of the original functions is translated [1]

Source [1]: <http://en.wikipedia.org/wiki/Convolution>



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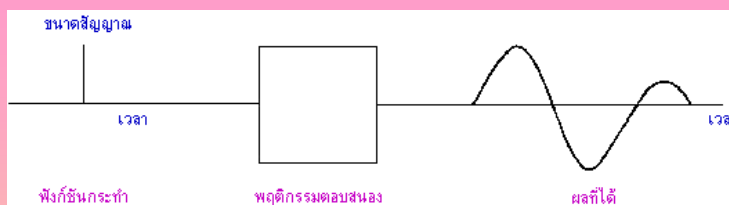


Figure 1. Wave vibration from smashing soil that distribute along time series.

Example:

Smashing the soil at time-t , the soil will receive the energy from this action it causes wave vibration.

Convolution and related operations are found in many applications of many field such as science, engineering, economics and mathematics.



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Example 1

To promote the new theory of agricultural plantation, the Agricultural Co-Operatives (BAAC) announce to agriculture who live in Damnoen Saduak district, Ratchaburi, Thailand, for doing soft loan. The period of load is 7 weeks for 1 Rai per one family.

The agriculture were separated into 3 groups

Group #1 total 3 families

Group #2 total 4 families

Group #3 total 5 families

***Each group are about to start working one week away.**

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How much does it cost of the plan of BAAC for soft-loan preparation for each weeks ? How much of time consume for this project.

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Week No.	Expense Items	Cost (Baht)
1	Seed and plant-labors	1,000
2	Repairing seed	500
3 – 6	Fertilizer and insect-chemical	
	(will increasing cost 200 baht per week)	2,000
7	Harvest labors	500

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Please answer those question below

1. What is the input function ?.....
2. What is the Response function?.....
3. How much does the period of this sequence event?

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SOLVE

week	1	2	3	4	5	6	7				
0	0	1	0.5	2	2.2	2.4	2.6	0.5	0	0 (*10 ³ Baht)	
5	4	3	$(5*0) + (4*0) + (3*1) = 3$ thousand baht								
	5	4	3	$(5*0) + (4*1) + (3*0.5) = 5.5$ thousand baht							
		5	4	3 = 13 * 10 ³ baht						
			5	4	3 = 17.1 * 10 ³ baht					
				5	4	3 = 26 * 10 ³ baht				
					5	4	3 = 28.4 * 10 ³ baht			
						5	4	3 = 23.9 * 10 ³ baht		
							5	4	3 = 15 * 10 ³ aht	
								5	4	3 = 2.5*10 ³ baht

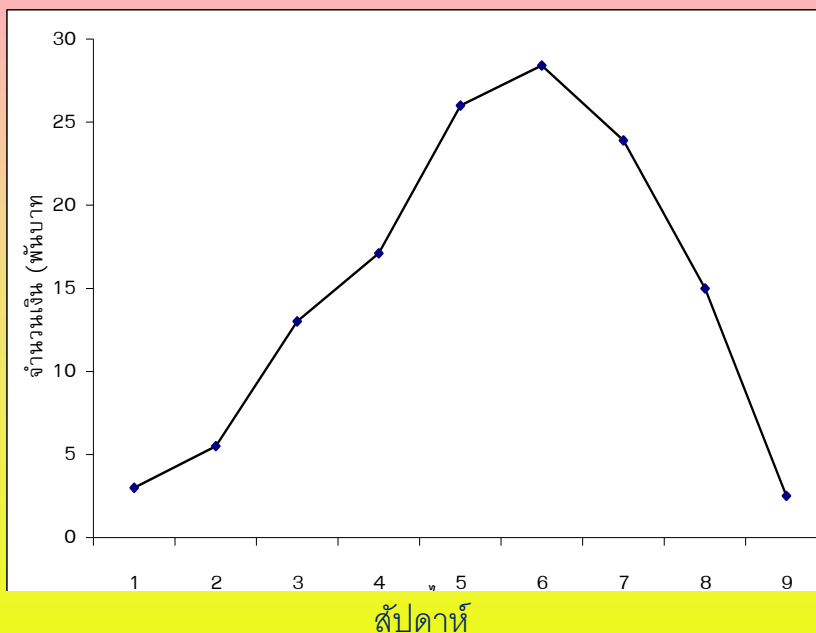
Total 9 weeks Bank for Agriculture and Agricultural Co-Operatives (BAAC) will use the budget 134,400 Baht

Convolution

Input function => Budget expense every weeks

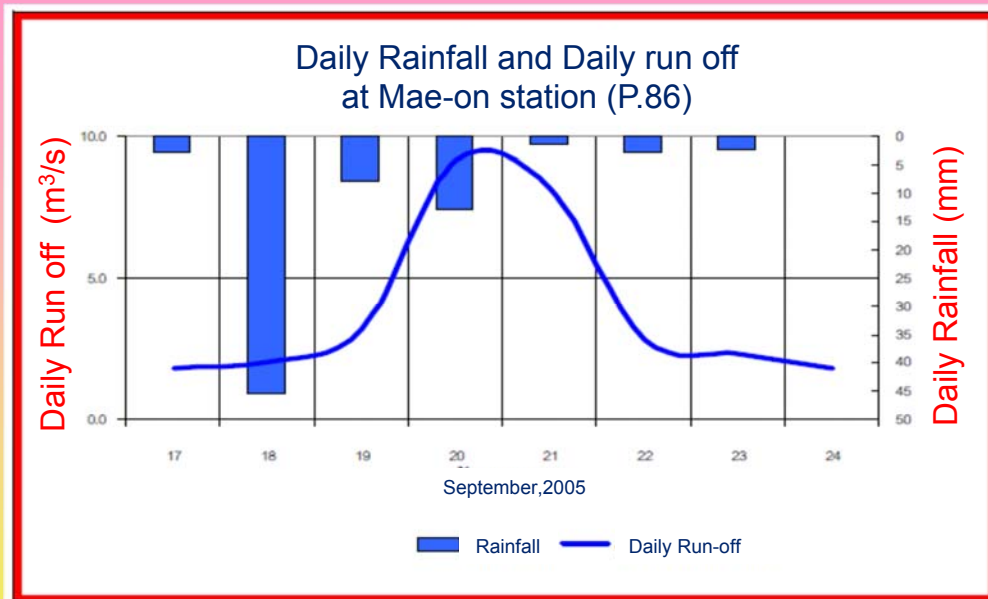
Behavior/ response => BAAC loan

Output/response function => Total BAAC budget of each weeks.



Maximum budget use at week#6 and the last week use minimum budget (week#9)

Practice



Input function => Daily Rainfall
Respond => River basin/ unit daily runoff
Output or response function => Daily runoff

Maximum flood occur on September 20 ,2005