

Lecture 3, Cloud (€/€ aspects)

About the economic side of Cloud

Example from <https://aws.amazon.com/ec2/pricing/> (as of 13.09.2021)

- Free tier
 - AWS Free Tier includes 750 hours of Linux and Windows t2.micro instances, (t3.micro for the regions in which t2.micro is unavailable) each month for one year. To stay within the Free Tier, use only EC2 Micro instances.
- On-Demand
 - With On-Demand instances, you pay for compute capacity by the hour or the second depending on which instances you run.
- Spot instances
 - Amazon EC2 Spot instances allow you to request spare Amazon EC2 computing capacity for up to 90% off the On-Demand price.
- Reserved Instances
 - provide you with a significant discount (up to 72%) compared to On-Demand Instance pricing. In addition, when Reserved Instances are assigned to a specific Availability Zone, they provide a capacity reservation, giving you additional confidence in your ability to launch instances when you need them.

AWS Free tier

- 750 hours /month of Linux
- Database and other services

Name	vCPUs	Memory (GiB)	Baseline Performance/v CPU	CPU Credits earned/hr	Network burst bandwidth (Gbps)	EBS burst bandwidth (Mbps)	On-Demand Price/hr*	1-yr Reserved Instance Effective Hourly*	3-yr Reserved Instance Effective Hourly*
t3.nano	2	0.5	5%	6	5	Up to 2,085	\$0.0052	\$0.003	\$0.002
t3.micro	2	1.0	10%	12	5	Up to 2,085	\$0.0104	\$0.006	\$0.005
t3.small	2	2.0	20%	24	5	Up to 2,085	\$0.0209	\$0.012	\$0.008
t3.medium	2	4.0	20%	24	5	Up to 2,085	\$0.0418	\$0.025	\$0.017
t3.large	2	8.0	30%	36	5	Up to 2,780	\$0.0835	\$0.05	\$0.036
t3.xlarge	4	16.0	40%	96	5	Up to 2,780	\$0.1670	\$0.099	\$0.067
t3.2xlarge	8	32.0	40%	192	5	Up to 2,780	\$0.3341	\$0.199	\$0.133

Lets calculate a bit

One year plan

- Reserved Instance Price/hr*: 0.025\$
- There are $24 * 365 = 8760$ hours / year

⇒ 219 \$ / year

Three year plan

- Reserved Instance : 0.017
- 26295h

⇒ 447\$ / 3 years

On demand

- Price/hr*: 0.0418\$
- There are $24 * 365 = 8760$ hours / year

⇒ 353 \$ / year

⇒ 1061\$ / 3 years

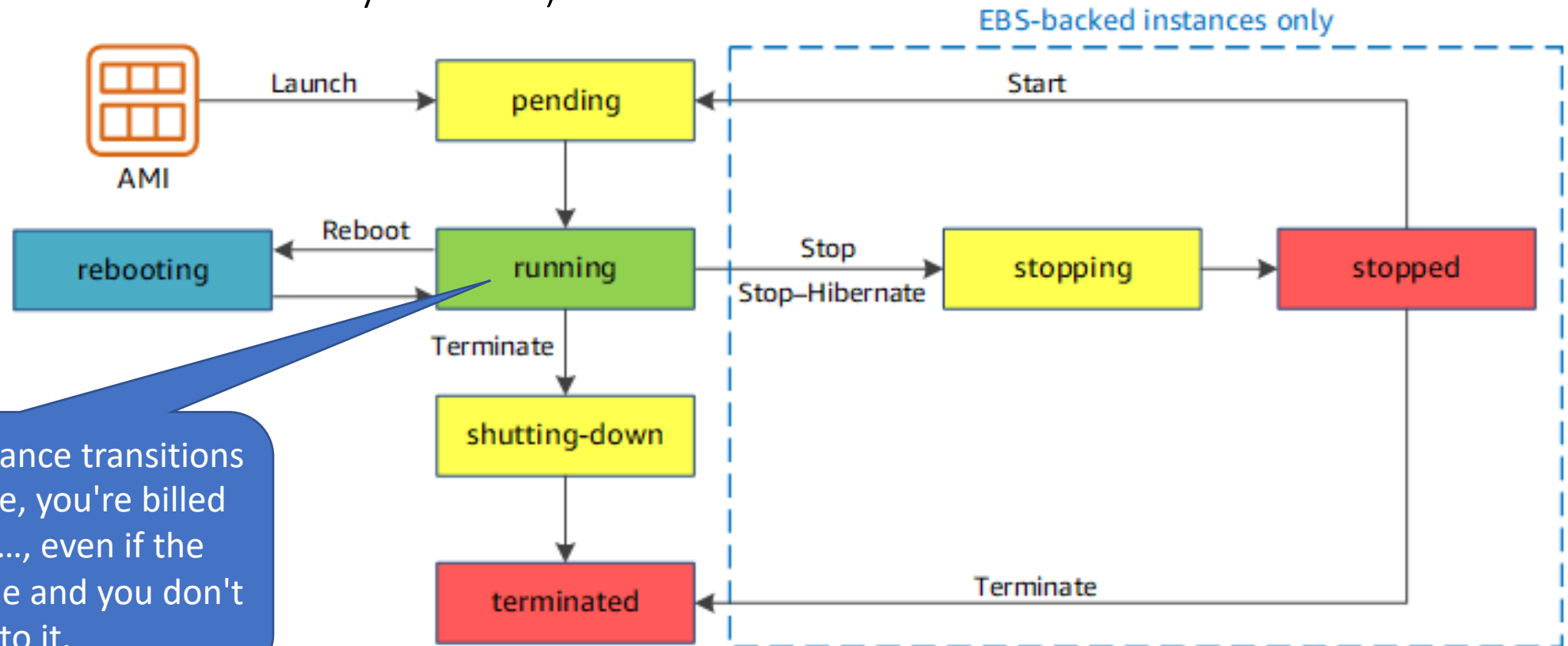
So

1y: if you use more than 15h/day

3y: if you use more than 10h/day

Instance life-cycle

(<https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/ec2-instance-lifecycle.html>)



As soon as your instance transitions to the running state, you're billed for each second, ..., even if the instance remains idle and you don't connect to it.

Note

The table indicates billing for instance usage only. Some AWS resources, such as Amazon EBS volumes and Elastic IP addresses, incur charges regardless of the instance's state.

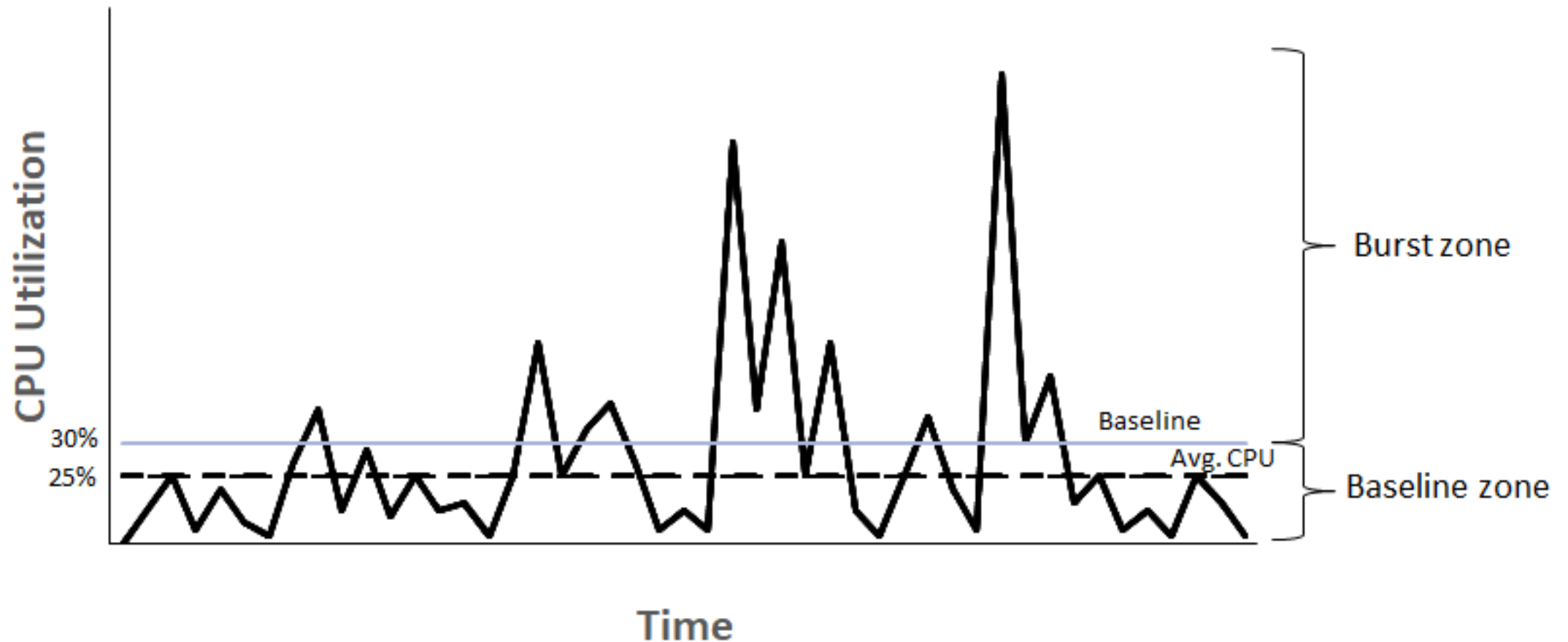
For more information, see [Avoiding Unexpected Charges](#) in the *AWS Billing and Cost Management User Guide*.

But there is some soft of elasticity

Each burstable performance instance continuously earns credit when it stays below the CPU baseline, and continuously spends credits when it bursts above the baseline. The amount of credits earned or spent depends on the CPU utilization of the instance:

- If the CPU utilization is below baseline, then credits earned are greater than credits spent.
- If the CPU utilization is equal to baseline, then credits earned are equal to credits spent.
- If the CPU utilization is higher than baseline, then credits spent are higher than credits earned.

Example of t3.large



One master thesis estimated for CI/CD pipeline

Component	Service	Item	Units	Unit price	Monthly price
Computing	EC2	t2.medium	4320h	\$0.06	\$259.20
Storage	EBS	GP2 SSD	208GB	\$0.149	\$30.99
Networking	VPC	VPN GW	720h	\$0.052	\$36.00
Networking	VPC	NAT GW	720h	\$0.052	\$37.44
Total price per month					\$363.63
Total price per year					\$4363.56

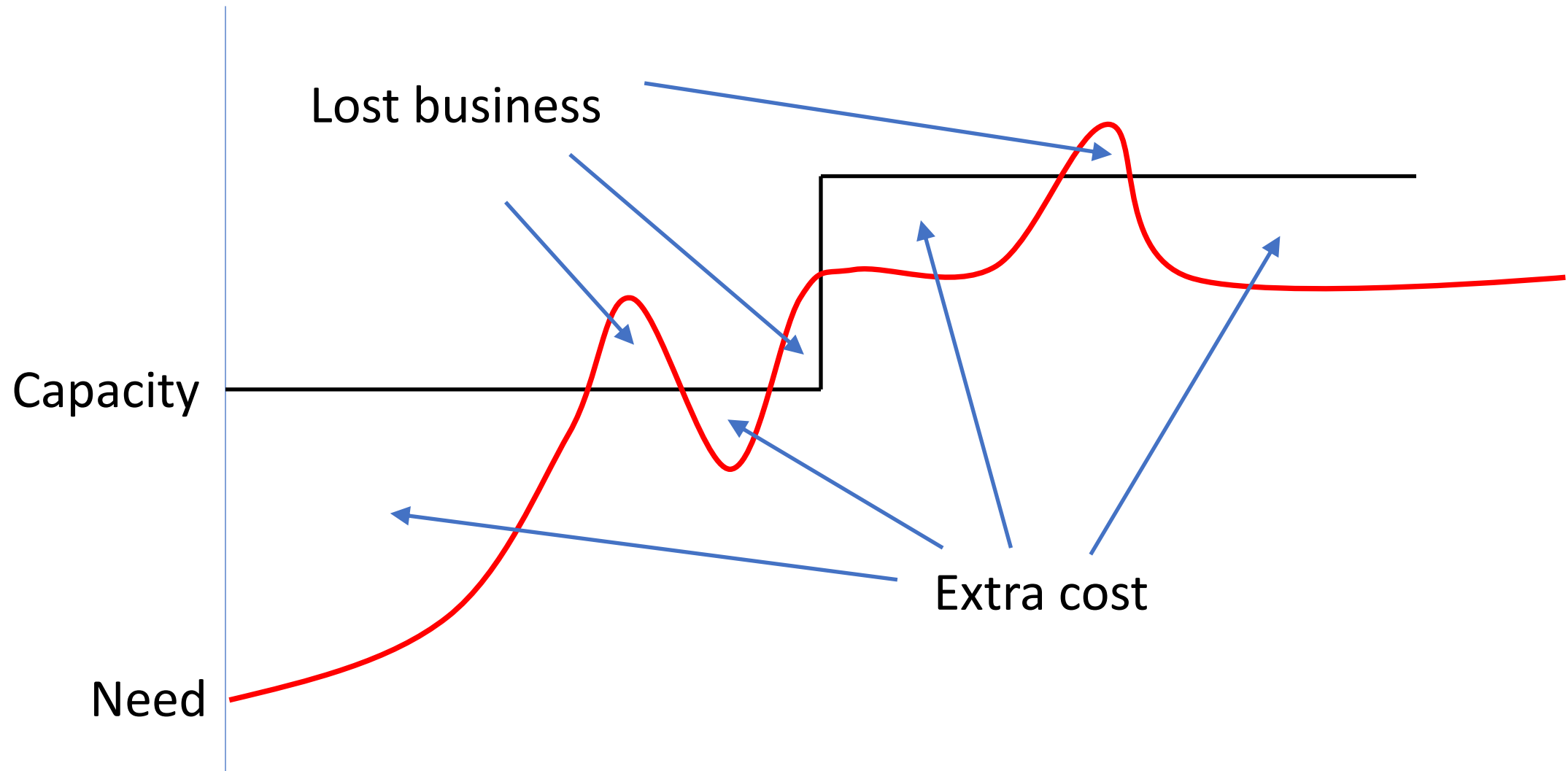
How about running costs?

CAPEX, OPEX?

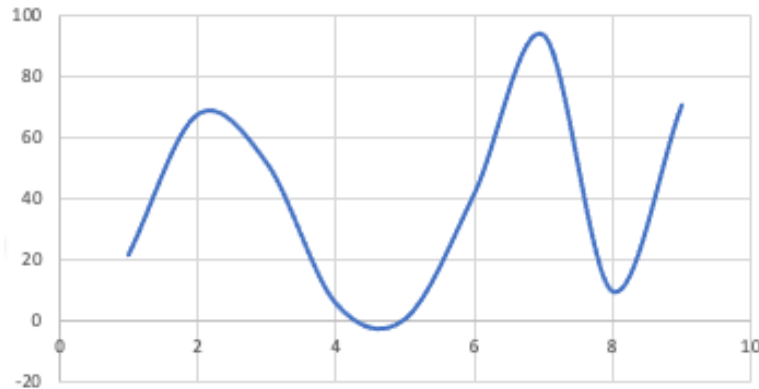
Important disclaimer

- This was just a sneak preview on the matter
- for on vendor only
- at one time only
- There is much more complexity
 - Compute
 - Storage
 - Network

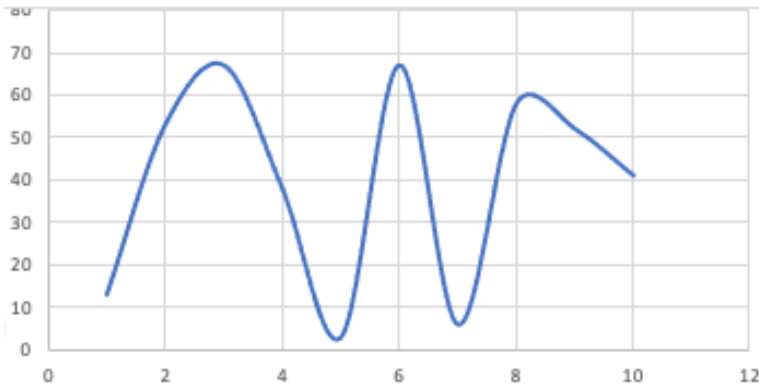
We should not forget the elasticity



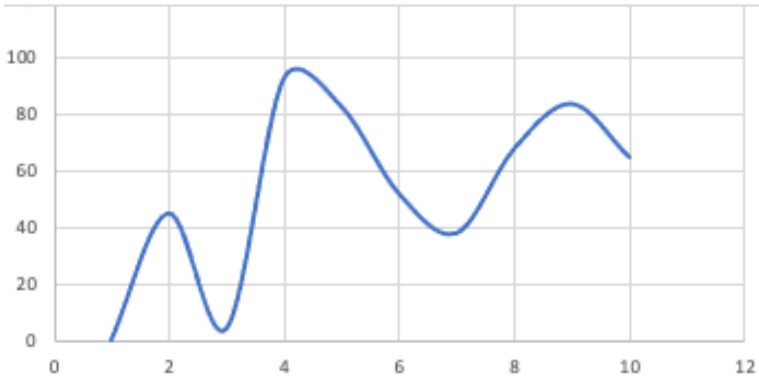
Then there is the pooling



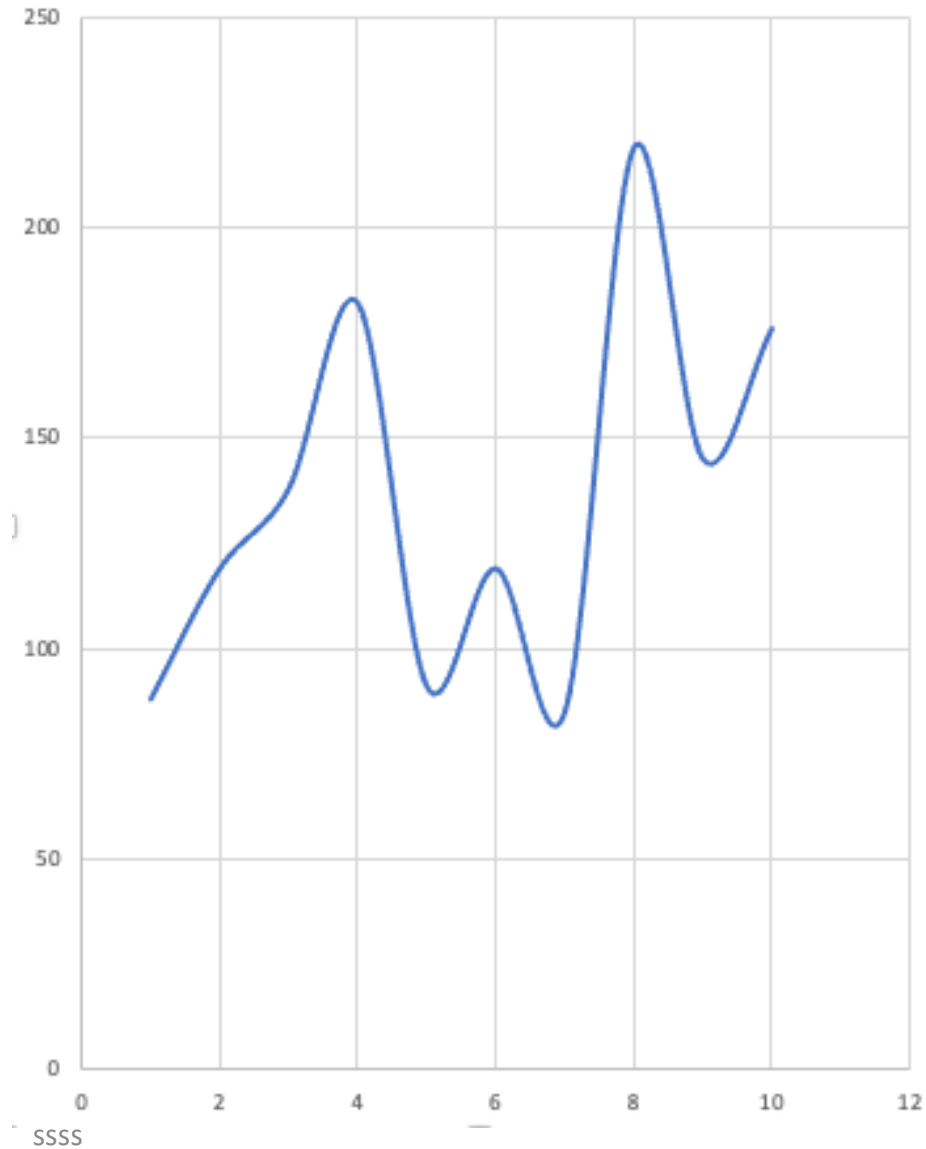
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AVE/MAX=0.59



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MAX=219
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