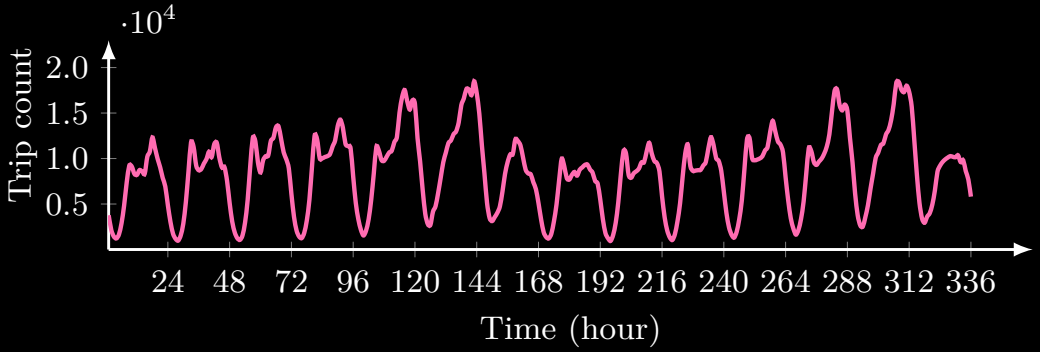
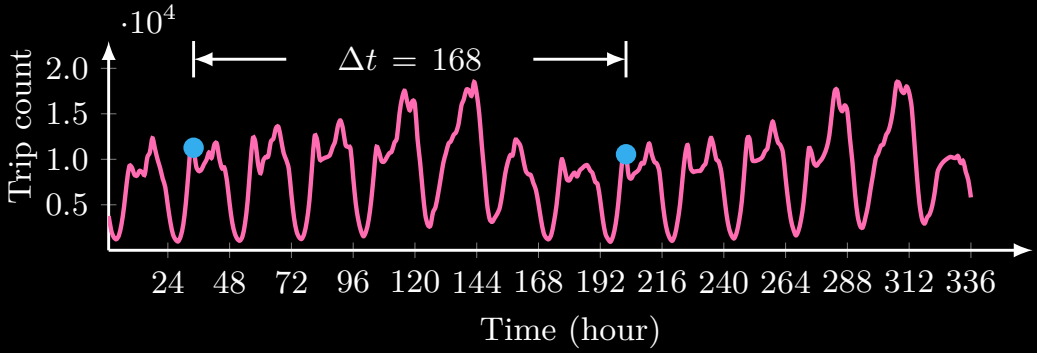
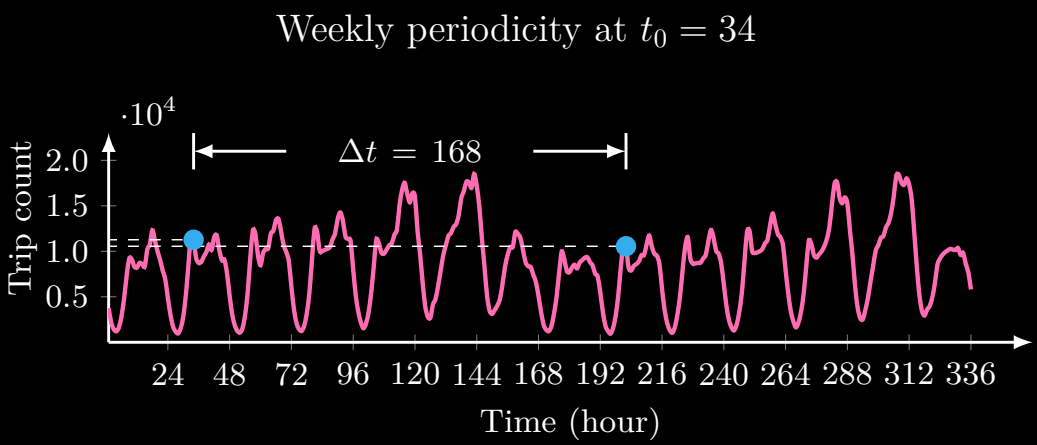
Essential Ideas of Sparse Autoregression

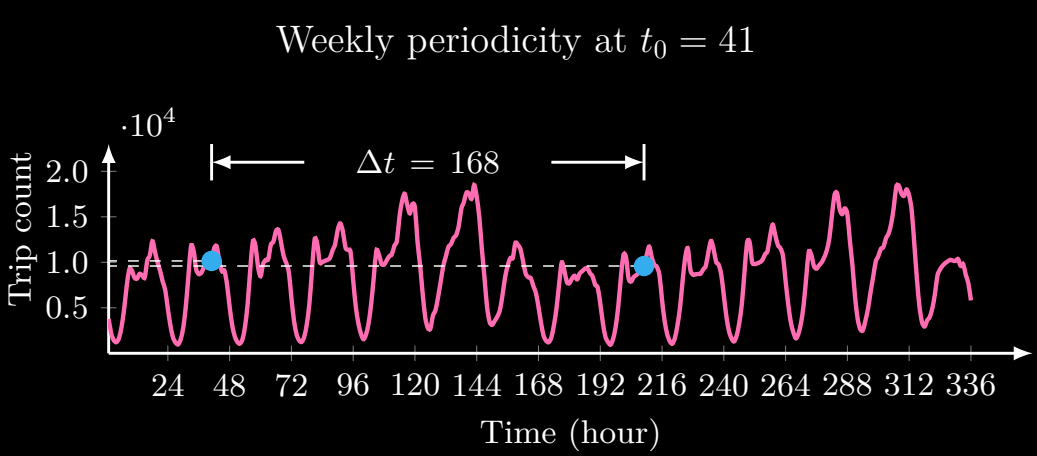
Annotating Ridesharing Trip Time Series

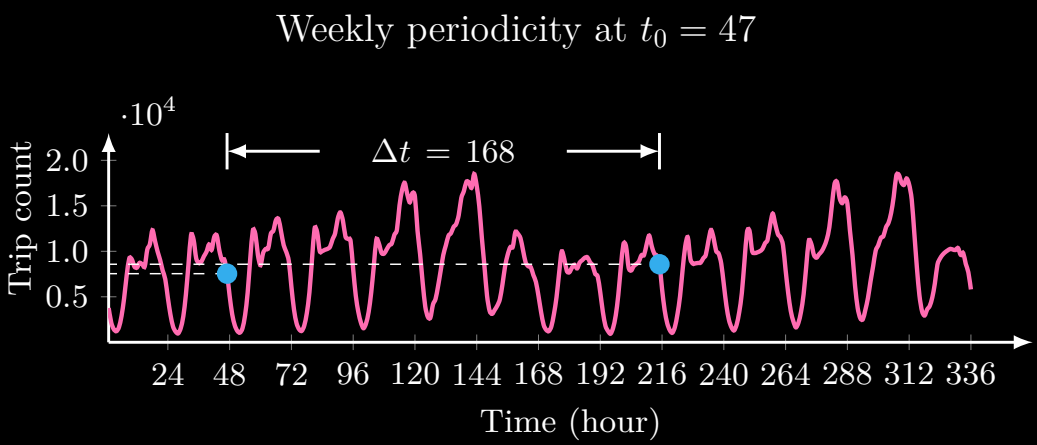
Chicago ridesharing trip time series x_t, $t = 1, \cdots, 336$

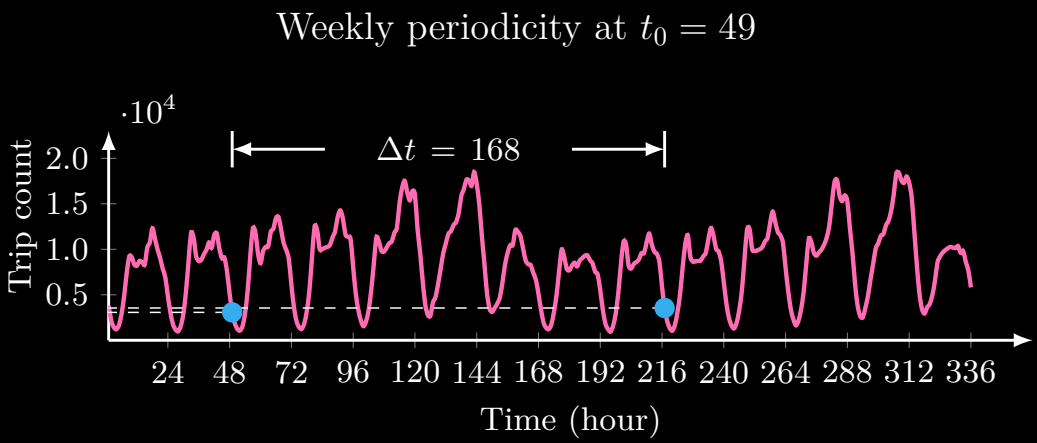


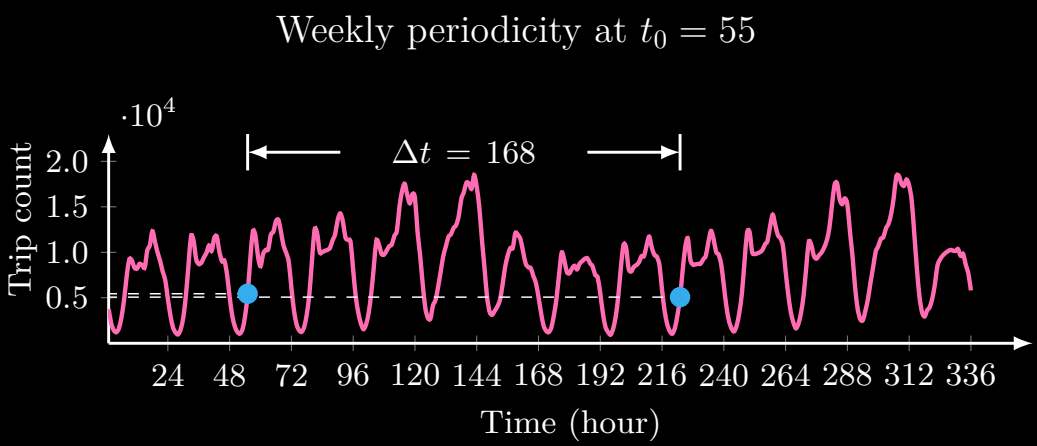

$\cdot 10^4$
Trip count
2.0
1.5
1.0
0.5
$\Delta t = 168$
24 48 72 96 120 144 168 192 216 240 264 288 312 336
Time (hour)

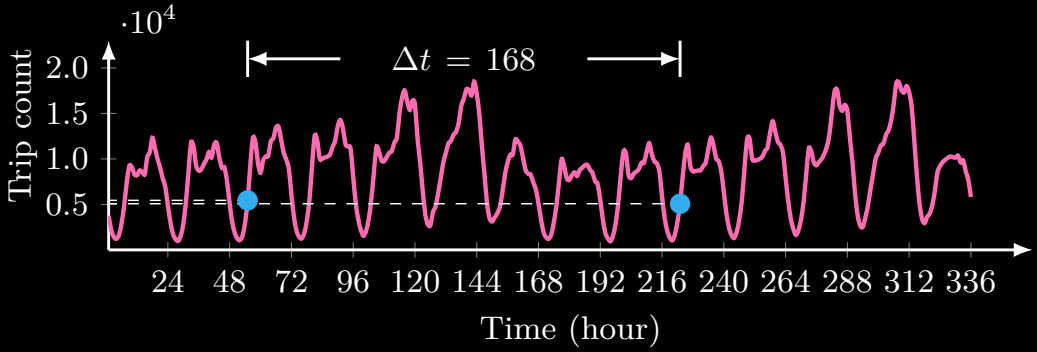

Weekly periodicity at $t_0 = 34$
$\cdot 10^4$
Trip count
2.0
1.5
1.0
0.5
$\Delta t = 168$
24 48 72 96 120 144 168 192 216 240 264 288 312 336
Time (hour)


Weekly periodicity at $t_0 = 41$
$\cdot 10^4$
Trip count
2.0
1.5
1.0
0.5
$\Delta t = 168$
24 48 72 96 120 144 168 192 216 240 264 288 312 336
Time (hour)


Weekly periodicity at $t_0 = 47$
$\cdot 10^4$
Trip count
2.0
1.5
1.0
0.5
$\Delta t = 168$
24 48 72 96 120 144 168 192 216 240 264 288 312 336
Time (hour)


Weekly periodicity at $t_0 = 49$
$\cdot 10^4$
Trip count
2.0
1.5
1.0
0.5
$\Delta t = 168$
24 48 72 96 120 144 168 192 216 240 264 288 312 336
Time (hour)


Weekly periodicity at $t_0 = 55$
$\cdot 10^4$
Trip count
2.0
1.5
1.0
0.5
$\Delta t = 168$
24 48 72 96 120 144 168 192 216 240 264 288 312 336
Time (hour)

Auto-correlations

$$\min_{w_{\Delta t}} \sum_t (x_t - w_{\Delta t} x_{t-\Delta t})^2 \quad \Rightarrow \quad w_{\Delta t} =$$