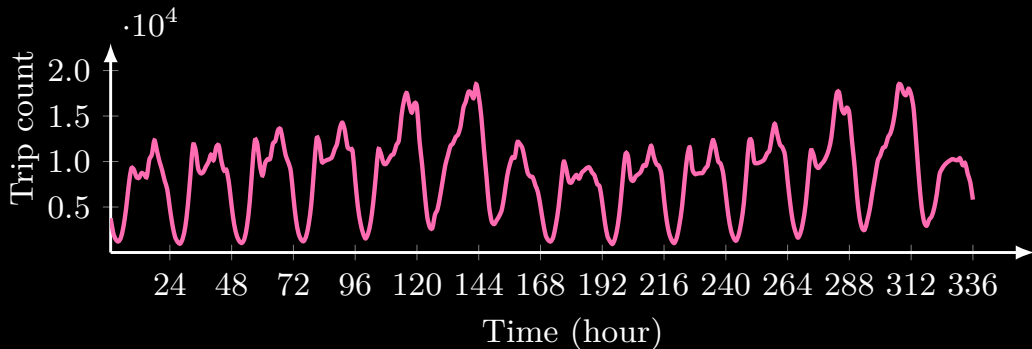
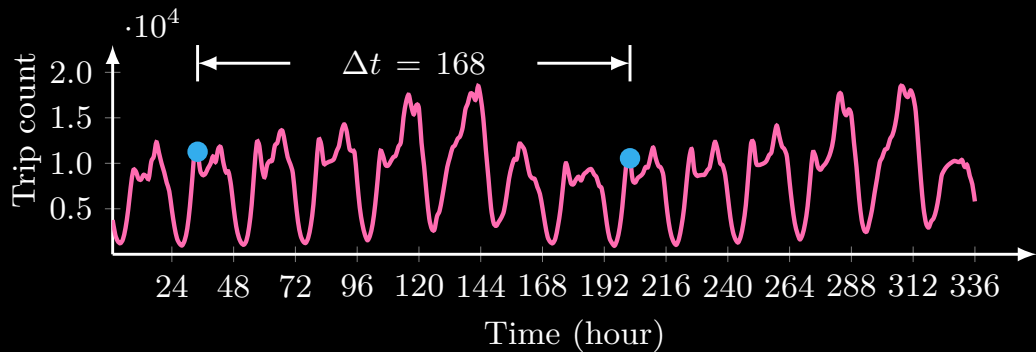


# Essential Ideas of Sparse Autoregression

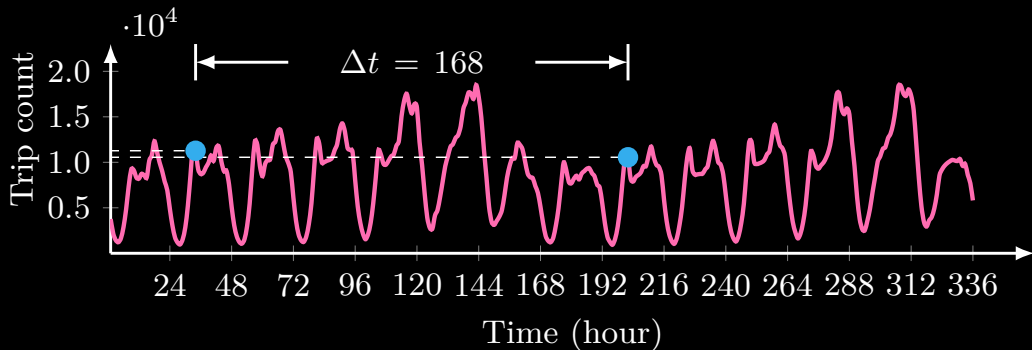
Annotating Ridesharing Trip Time Series

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

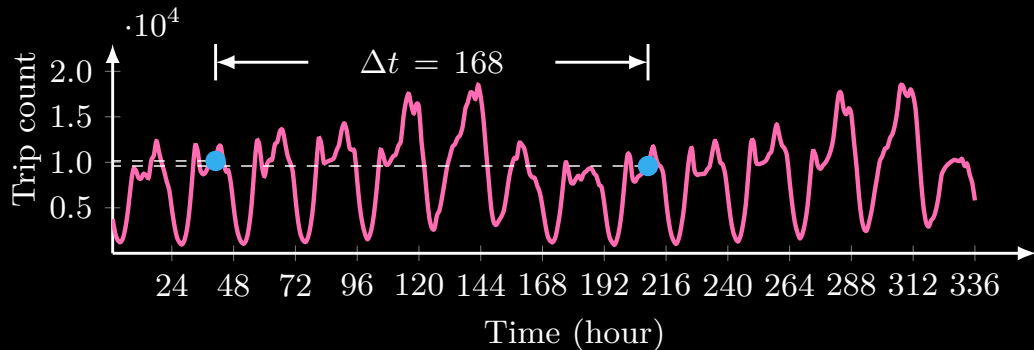




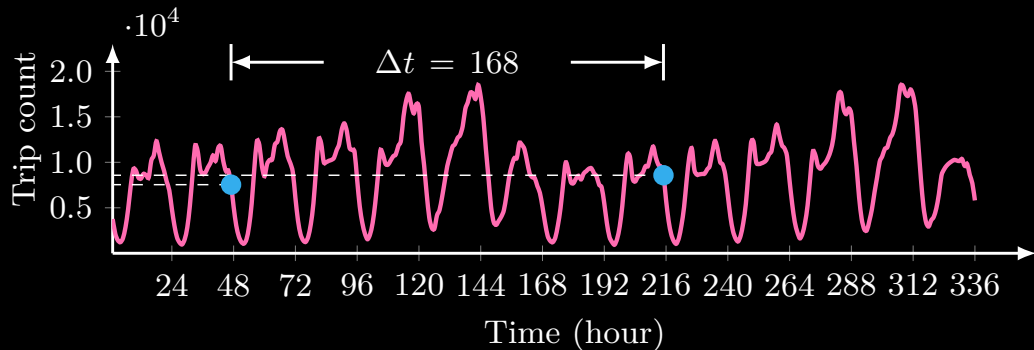
Weekly periodicity at  $t_0 = 34$



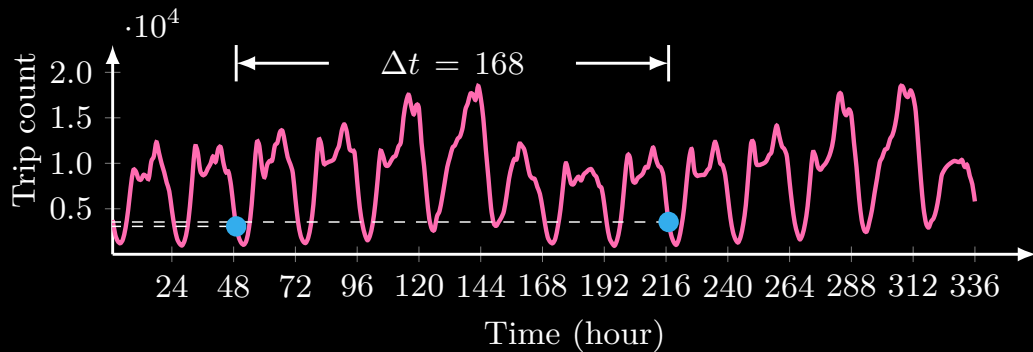
Weekly periodicity at  $t_0 = 41$



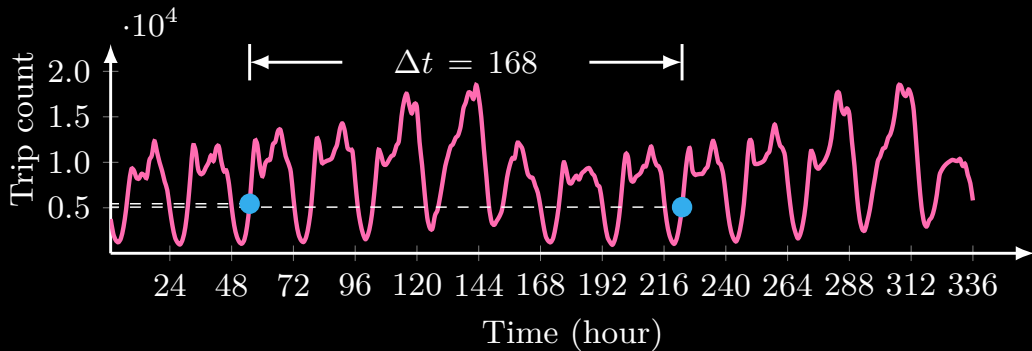
Weekly periodicity at  $t_0 = 47$



Weekly periodicity at  $t_0 = 49$

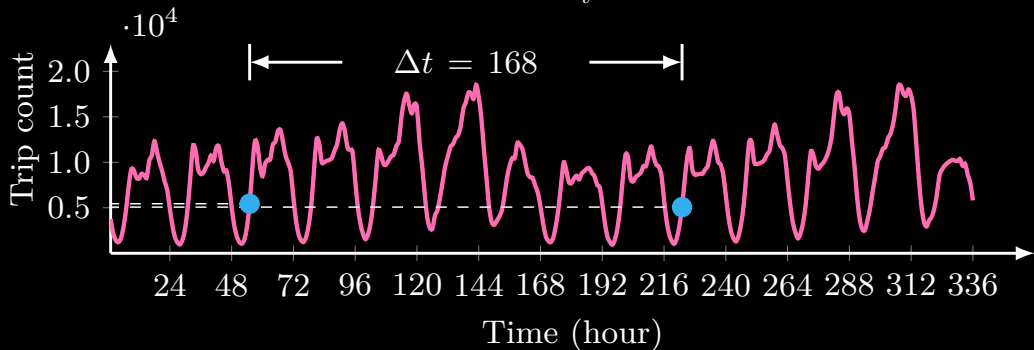


Weekly periodicity at  $t_0 = 55$





Auto-correlations.  $\min_{w_{168}} \sum_t (x_t - w_{168} x_{t-168})^2$



## Time Series Autoregression

$$\left( x_t - \sum_{k=1}^d w_k x_{t-k} \right)^2$$

## Time Series Autoregression

$$f \triangleq \sum_t \left( x_t - \sum_{k=1}^d w_k x_{t-k} \right)^2$$

## Time Series Autoregression

$$\min_{w_1, \dots, w_d} f \triangleq \sum_t \left( x_t - \sum_{k=1}^d w_k x_{t-k} \right)^2$$