# Part 2: Data Smoothing

**(a-1) Compute a running mean smoother by hand**

|  |  |  |  |
| --- | --- | --- | --- |
| **Running Mean Smoother** | | | |
| Window width | | 3 hours | |
| **Time** | Hour | Ave.Veh | Ave.Veh |
| 06:00 | 6 | - | N/A |
| 07:00 | 7 | (200+350+500)/3 | 350.000 |
| 08:00 | 8 | (350+500+420)/3 | 423.333 |
| 09:00 | 9 | (500+420+380)/3 | 433.333 |
| 10:00 | 10 | (420+380+300)/3 | 366.667 |
| 11:00 | 11 | (380+300+250)/3 | 310.000 |
| 12:00 | 12 | (300+250+220)/3 | 256.667 |
| 13:00 | 13 | (250+220+200)/3 | 223.333 |
| 14:00 | 14 | (220+200+280)/3 | 233.333 |
| 15:00 | 15 | (200+280+400)/3 | 293.333 |
| 16:00 | 16 | (280+400+550)/3 | 410.000 |
| 17:00 | 17 | (400+550+600)/3 | 516.667 |
| 18:00 | 18 | - | N/A |

**(a-2) Draw your solution on a scatter plot of the data**

**(a-3) Validate your solution in R**

**------** (Code and Output shown in the following section) -----

**(b) Use R to compute a running mean smoother using ksmooth()**

**------** (Code and Output shown in the following section) -----

**(c-1) Create a Gaussian kernel smoother in Excel**

|  |  |  |  |
| --- | --- | --- | --- |
|  | σ | 2 |  |
|  | λ = 2\*σ^2 | 8 |  |
|  | Weights | wi |  |
|  |  |  |  |
| **Gaussian Kernel Smoother in Excel** | | | |
| Standard deviation is two hours | | | |
| **Time** | Hour | Vehicles | Gaussian Kernel Values |
| 06:00 | 6 | 200 | 338.0665 |
| 07:00 | 7 | 350 | 360.0905 |
| 08:00 | 8 | 500 | 372.6262 |
| 09:00 | 9 | 420 | 369.2072 |
| 10:00 | 10 | 380 | 348.6222 |
| 11:00 | 11 | 300 | 318.1419 |
| 12:00 | 12 | 250 | 291.1620 |
| 13:00 | 13 | 220 | 281.2593 |
| 14:00 | 14 | 200 | 296.4157 |
| 15:00 | 15 | 280 | 335.1786 |
| 16:00 | 16 | 400 | 387.3647 |
| 17:00 | 17 | 550 | 440.2893 |
| 18:00 | 18 | 600 | 485.3281 |

**(c-2) Validate your solution by hand**

A math equations and formulas

AI-generated content may be incorrect.



**(c-3) Draw your solution on a scatter plot of the data**

**(c-4) Validate your solution in R**

**------** (Code and Output shown in the following section) -----

**(d) Create the Gaussian kernel smoother with R, using the function ksmooth()**

**------** (Code and Output shown in the following section) -----

**(e) Use a LOESS smoother for this data set**

**------** (Code and Output shown in the following section) -----