A sign says: **NO PARKING**

- 7-9am
- 4-6pm
- Mon-Fri

Using variables like $t$ for time of day and $d$ for day of week, write a binary expression that says when there is no parking.

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My first attempt is:

$$(7am \leq t < 9am \lor 4pm \leq t < 6pm) \land Mon \leq d \leq Fri$$

For the time $t$, it is not important whether we use $<$ or $\leq$. But the problem is that the days cycle. Saturday comes after the preceding Monday and before the following Friday. Likewise the times of day cycle, so that midnight comes after the preceding 4pm and before the following 6pm. So I will represent a day as a string of length 3:

year; week; day

and a time as a string of length 4:

year; week; day; time

I need the weeks to start on a Saturday or a Sunday or a Monday; let's say Monday, so

Mon < Tue < Wed < Thu < Fri < Sat < Sun

A year might not start on Monday, so week 1 might be a partial week. Likewise week 53 might be a partial week. My answer is:

$$y; w; Mon \leq y; w; d \leq y; w; Fri$$

$$\land \quad (y; w; d; 7am \leq y; w; d; t < y; w; d; 9am$$

$$\lor y; w; d; 4pm \leq y; w; d; t < y; w; d; 6pm)$$

In any given year $y$ and week $w$, if the day $d$ is between Mon and Fri, and on that day the time $t$ is between 7am and 9am or between 4pm and 6pm, then there is no parking.