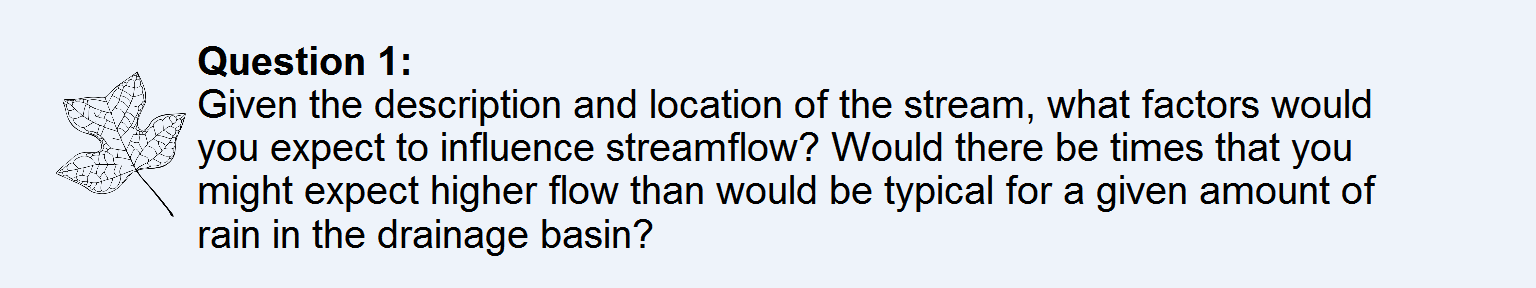
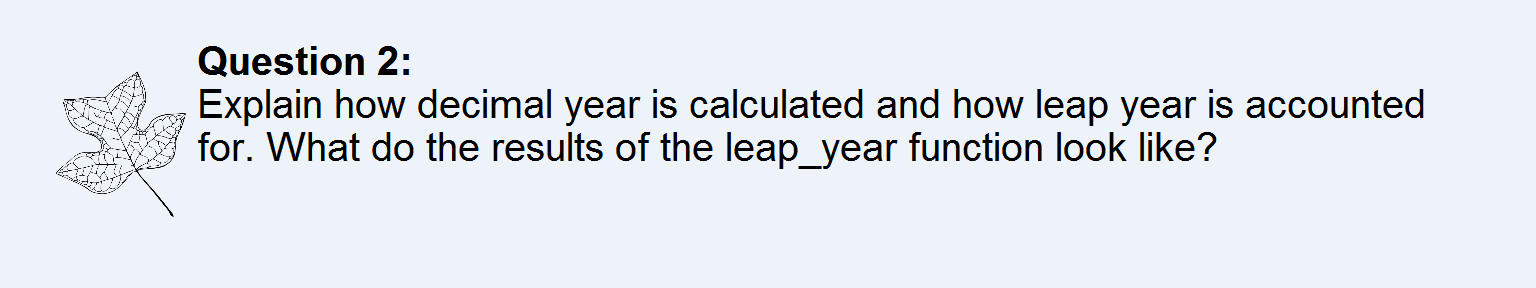
Charlie Huemmler

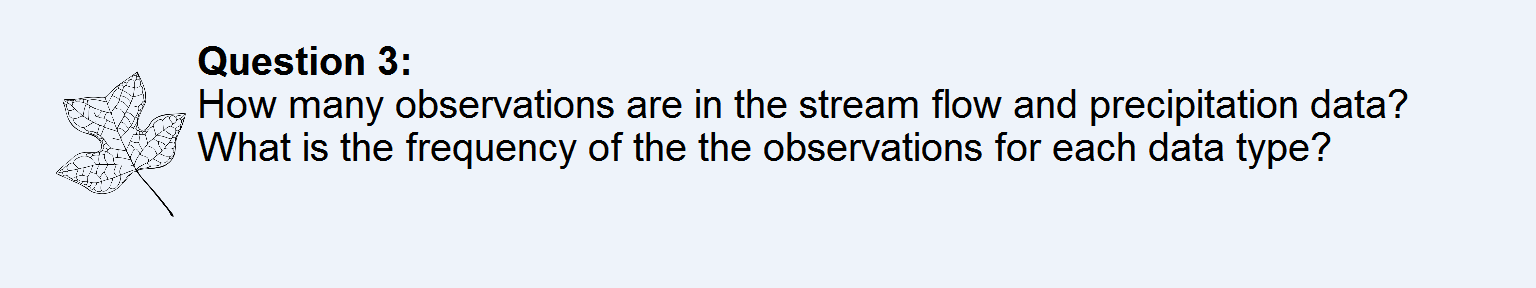
Prof. Kropp



Stream flow will be influenced by precipitation by a lag. This lag will vary depending on temperature. When I it rains normally, flow will increase, but when it rains when snow is already on the ground, or if there is an unusually warm day with snow on the ground, snowmelt will cause flow to spike. This will happen in the spring time.

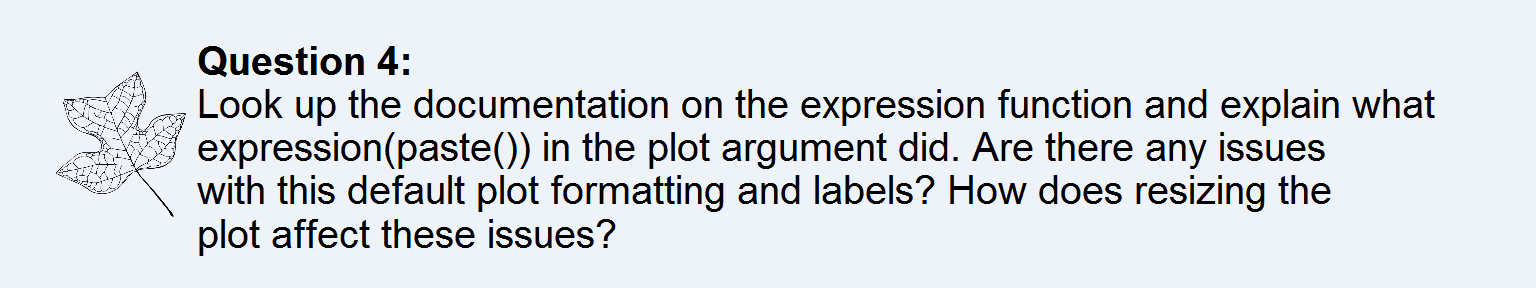


Decimal year is calculated first by calculating the decimal day of year. This is the day of the year, plus the proportion of day that has already passed at the time of observation. The decimal day of year is then divided by the amount of days in a year so it is out of 1, then added to the year itself. The function leap\_year returns a Boolean for if the year is a leap year or not.

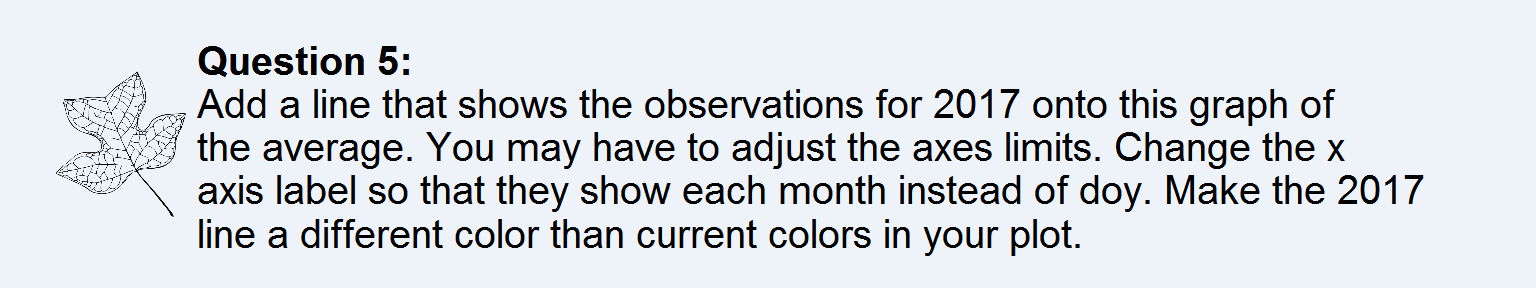


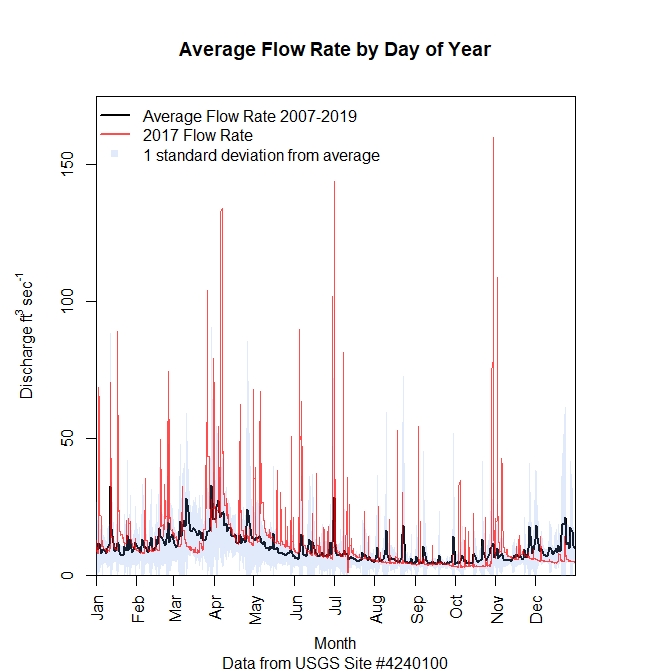
There are 393,798 reliable observations of stream flow, and 16,150 observations of precipitation. The stream flow data is collected every 15 minutes, while the precipitation data is collected hourly.

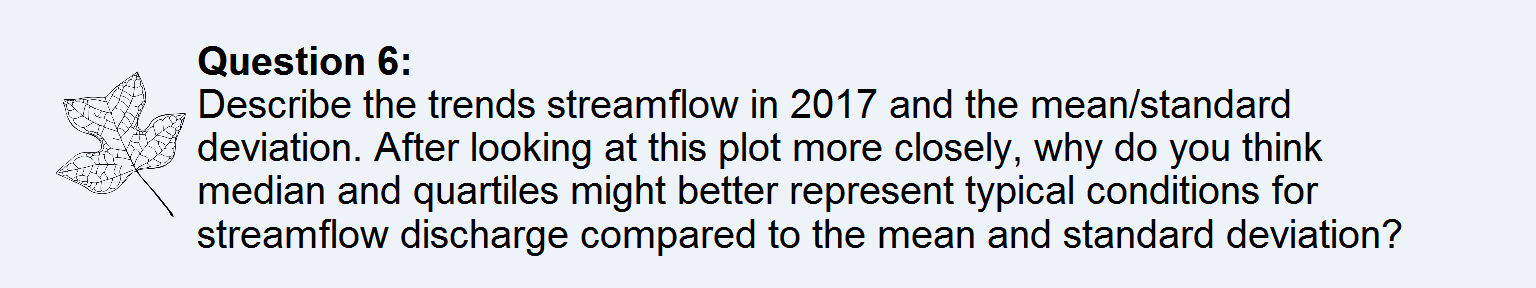
As stream flow is collected 4 times as often as precipitation, you would expect there to be 4 times as many observations, but that is not the case. Looking at the respective ranges of measurements, precipitation data ranges from 2007- 2013, while stream flow is from 2007- 2019. Weirdly, these extra 6 years don’t account for stream flow having more observations. It seems some hours are removed from the precipitation data; I could not find why these observations were removed.



Expression allows for superscripts (eg: x3). Paste combines the two strings that are separated by a comma. The y-axis label’s superscripts go over the border of the plot window, regardless of how it is resized.

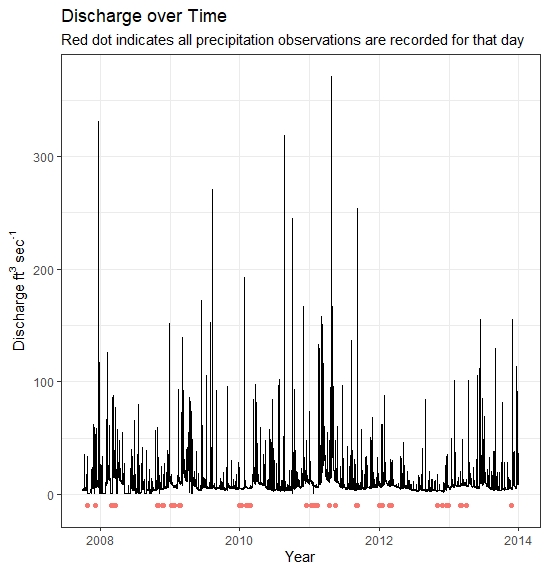
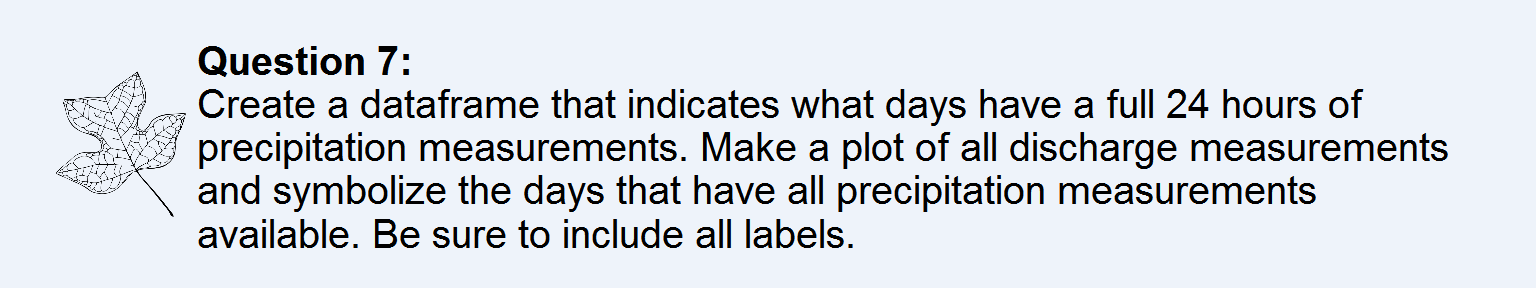


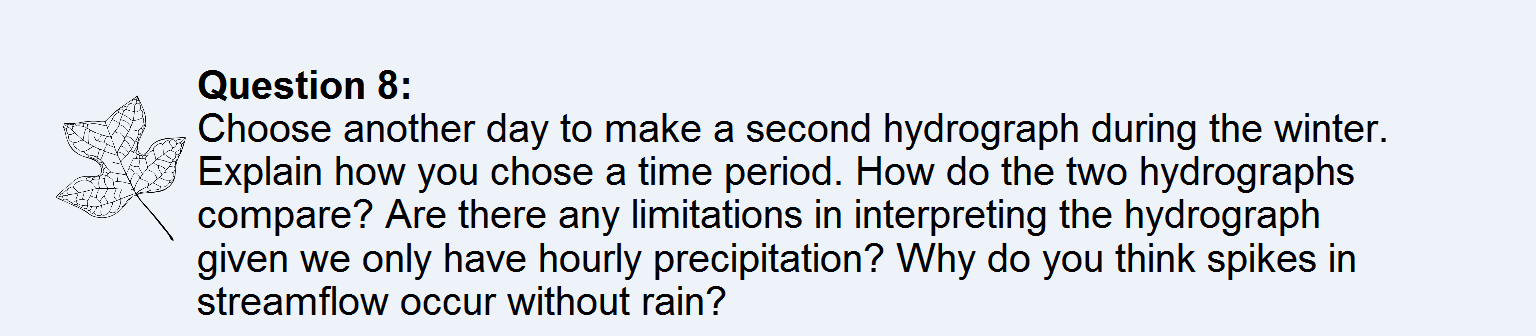


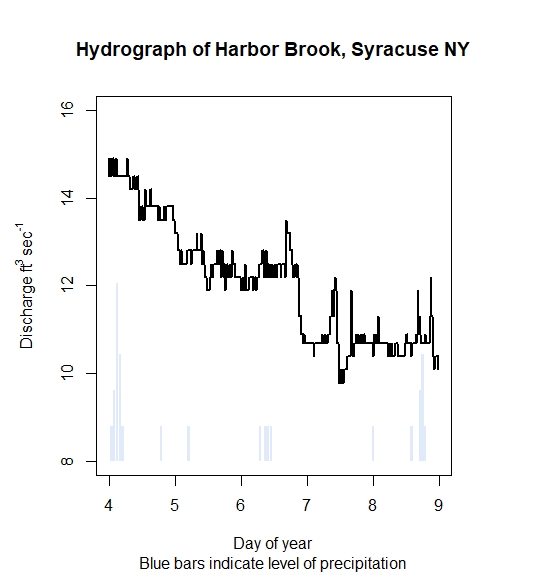


We see an overall increase in stream flow during the spring months, with some large storms causing large streamflows occasionally throughout the year, notably the 2017 storm in early November.

Median and quartiles will represent the data better is it is the nature of precipitation and streamflow to have a lot of outlying values. Mean and SD are highly affected by outliers, so we will get a better sense of the data using median and quartiles.

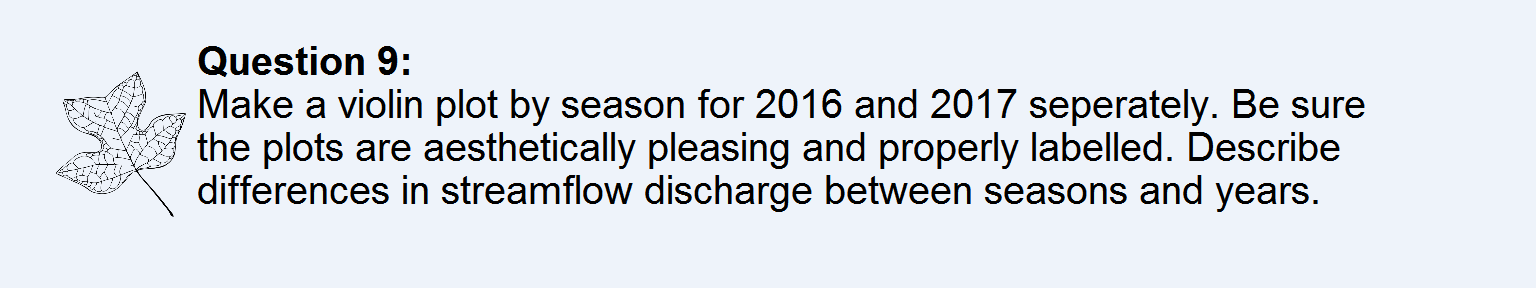


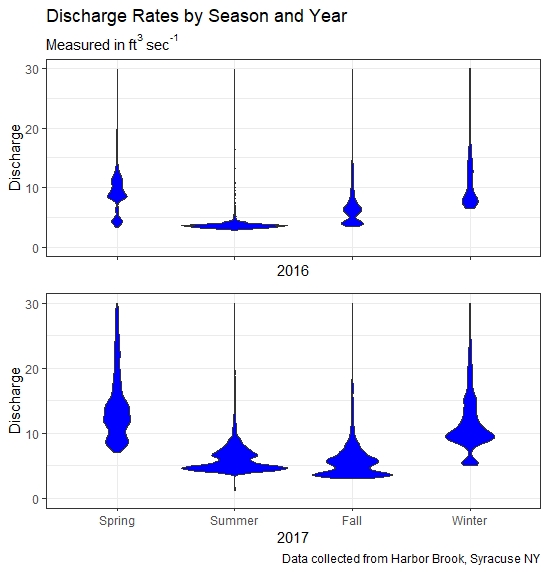




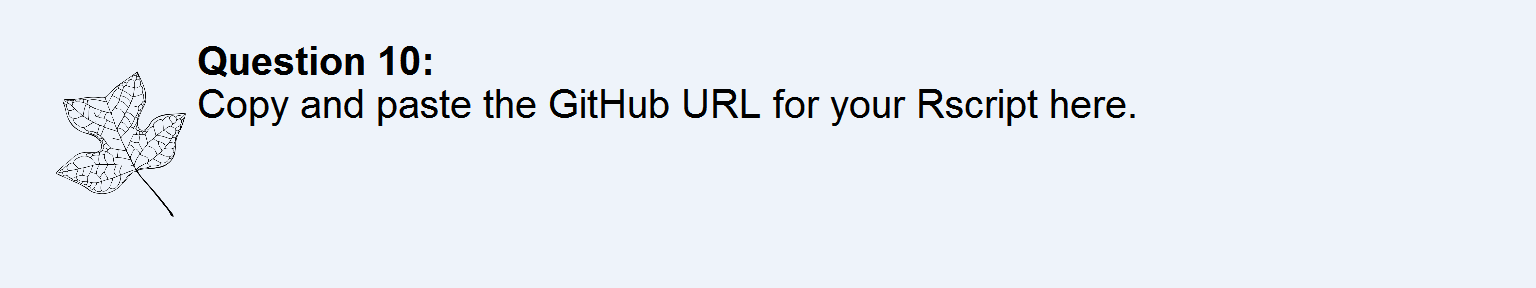
I chose these days as they are in the winter. I wanted to look at a longer range of time than just one day of data. Compared to the other hydrograph, we don’t see the correlation between precipitation and streamflow. This is due to the temperature. During these January days, precipitation is in the form of snow, which will not immediately wash down the creek. For the September days, rain will flow directly to the stream with little lag time.

Only having hourly precipitation data doesn’t necessarily limit our interpretations of our hydrograph. This would only be a concern if the rain was intermittent, with it stopping briefly during the measurement capture time. Spikes in streamflow occur without rain in relation to the temperature. If the temp is above freezing, snow will melt and increase streamflow in the creek.





Median streamflow tends to be highest in the Spring and Winter, and lower in the Summer and Fall. Even though this graph cuts out outliers, those have little effect on median. Between the two years, streamflow is fairly similar.



<https://github.com/chuemmler/GEOG331/blob/master/activity5/activity5script.R>