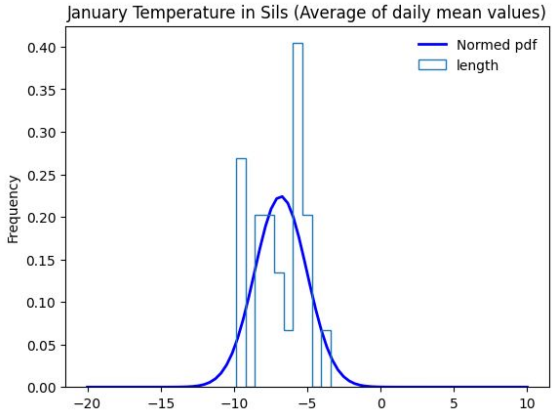
Research Question

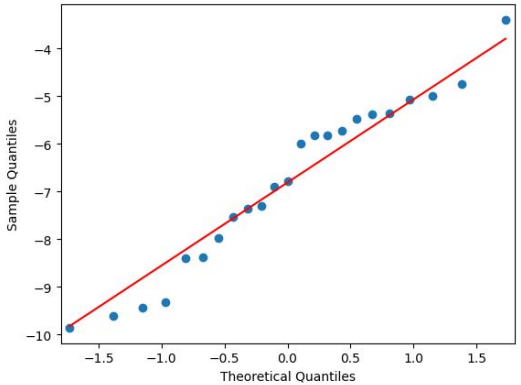
- By using the daily average temperatures from the weather station in Sils in Engadine we calculate the monthly average temperatures for the month of January for the years 2000 - 2023.
- Our working hypothesis (H_1) and null hypothesis (H_0) are therefore the following:
  - H_1: Average Temperature of January 2023 > Average Temperature of January 2000-2022
  - H_0: Average Temperature of January 2023 ≤ Average Temperature of January 2000-2022
- We assume that the average January temperatures will be normally distributed.
- We only have one group as we compare the average temperature of January 2023 to historic data.
- As we only look at one numeric variable, we don't have any groups to look for differences or other numeric variables to look for associational relationship.
- Therefore the **one sample t-test** seems to be the appropriate test for this question, as we want to test whether the average temperature of January 2023 is significantly higher than in the previous years.

Real Life Example & Conclusion



- The monthly average temperatures for the month of January for the years 2000 - 2023 as measured by the weather station in Sils in Engadine is displayed in the histogram. The average temperature for all of those years is -6.81℃, the standard deviation is 1.78℃, the minimum value lies at -9.85℃ in 2010 and the maximum value at -3.40℃ in 2007.
- The average temperature of January 2023 was -5.22℃.
- The Agostino-Pearson normality test gives us a p-value of 0.52, therefore the null hypothesis that x comes from a normal distribution cannot be rejected.
- Further, the Q-Q-Plot confirms that there could be a normal distribution.
- Interpretation: If the real average of the temperature on january is -5.21 Degrees Celsius and if the average temperature of the last 22 years is normally distributed, the probability of obtaining the observed t-statistic (or a more extreme value) is 0.01%.

Since the p-value is very close to 1, it suggests that there is not enough evidence to reject the null hypothesis. In other words, based on the provided data, there is little support to conclude that the average temperature of January 2023 is significantly greater than the average temperature of January in the years 2000 to 2022.

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The temperature mean of January 2023 = -5.216129032258064
TtestResult(statistic=-4.2970176400188995, pvalue=0.9998539648707837, df=22)
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The End