

In this assignment, you will analyze a data set that has been obtained from monitoring the temperature of a cooling cup of coffee. The temperature of Mr. Santowski's coffee has been measured as a function of the time since the coffee was made on a day when the room temperature was  $26.8^{\circ}\text{C}$ .

Time (min)	0	5	10	15	20	25	30	35	40	45	50
Temp ( $^{\circ}\text{C}$ )	82.5	73	65.5	61.7	57.7	54	51.1	49	47	45	43.1
Time (min)	60	71	80	89	100	110	120	150	180	210	240
Temp ( $^{\circ}\text{C}$ )	40.1	37.1	35.2	34.2	32.7	31.4	30.8	29	28	27.2	27

In this assignment, you are required to:

- (1) Prepare a scatterplot graph of the data using technology.
- (2) Provide an algebraic analysis of the data in order to generate an exponential equation that models the data set and fits the context of the data. Show/explain the analysis that leads to your conclusion. How can you confirm/verify that your equation is "correct"?
- (3) Rewrite your equation using the natural base  $e$ . Show the algebraic analysis that leads to your answer.
- (4) Graph the equation you just developed and show the function as well as the data set. Explain how well the equation does/doesn't fit the data. Offer explanations as to why/why not.

- (5) Use your model to predict the temperature of the coffee at a time of 30 minutes. 60 minutes. 180 minutes.
- (6) At what time will the temperature of the coffee be  $50^{\circ}\text{C}$ ?  $26^{\circ}\text{C}$ ? Show an algebraic solution.
- (7) How well does the function fit the data?
- (8) At what rate ( $^{\circ}\text{C}$  per minute) is the coffee cooling? Show/explain the analysis that leads to your conclusion.
- (9) BONUS OPTION: Analysis Method #2 - Semilog Graphing → Graph the data on semi-log paper. Determine the equation of the line of best fit. Rearrange this equation to an exponential equation in base 10 and then base  $e$ . Show work. You can get two or three cycle semi-log paper by following this link:  
([http://www.csun.edu/~vceed002/ref/measurement/data/graphpaper/semi\\_log\\_numbered.pdf](http://www.csun.edu/~vceed002/ref/measurement/data/graphpaper/semi_log_numbered.pdf))