stk310 PRACTICAL ASSIGNMENT A4

Where applicable, use appropriate procedures in SAS as well as functions in R to answer the following questions.
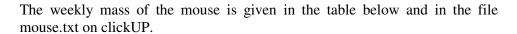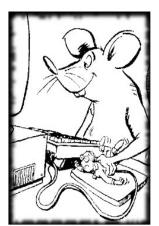
Question 1

A mouse was kept in a lab over a period of 9 weeks during which it was given sufficient food and water and its mass in grams was measured on a weekly basis.

The growth rate of the mouse must be modelled using the formula

$$Y_t = Y_0(1 + r)^t$$

where Y_t denotes the mass in grams at week $t = 1, 2, \ldots, 9$, Y_0 is the mouse's mass at birth and r is the compound growth rate.

The weekly mass of the mouse is given in the table below and in the file mouse.txt on clickUP.

t	1	2	3	4	5	6	7	8	9
Y_t	11.33	17.00	23.00	28.52	33.33	37.90	40.48	42.40	44.43

(a) Apply a suitable transformation to the growth rate formula to obtain a linear regression model.

(b) Fit the linear regression model from Question 1(a) in order to estimate the instantaneous rate of growth and the compound rate of growth of the mouse as well as its mass at birth.

Question 2

In an experiment to determine the relation between sound intensity level and distance, a 125 cc motorcycle was set to idle at 6 000 revolutions per minute and a sound level meter, placed at varying distances from the motorcycle, was used to measure the sound intensity level in decibels.

The distances in meters, X, and sound intensity level readings in decibels, Y, are given in the table below and are also given in the file sound-vs-distance.txt on clickUP.

X	2	4	6	8	10	12	14	16	18	20
Y	95	82	77	73	71	68	66	65	63	62

(a) Fit a reciprocal model to the data in order to determine the asymptotic sound intensity level.

(b) Draw a scatter diagram in which the sound intensity level is plotted against the distance, with a horizontal reference line added to the diagram to indicate the asymptotic sound intensity level.

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