log = log,

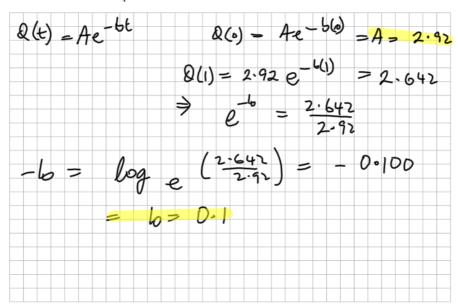
Question 4 (25 marks)

In a science experiment, a quantity Q(t) was observed at various points in time t. Time is measured in seconds from the instant of the first observation. The table below gives the results.

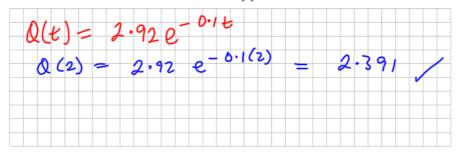
t	0	1	2	3	4
Q(t)	2.920	2.642	2.391	2.163	1.957

Q follows a rule of the form $Q(t) = Ae^{-bt}$, where A and b are constants.

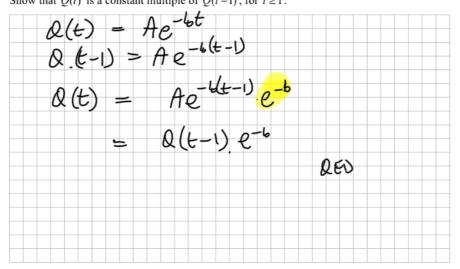
(a) Use any two of the observations from the table to find the value of A and the value of b, correct to three decimal places.



(b) Use a different observation from the table to verify your values for A and b.

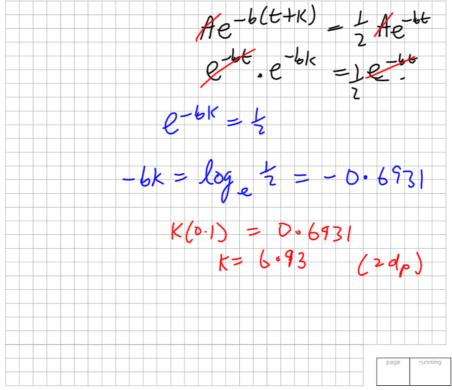


(c) Show that Q(t) is a constant multiple of Q(t-1), for $t \ge 1$.



(d) Find the value of the constant k for which $Q(t+k) = \frac{1}{2}Q(t)$, for all $t \ge 0$.

Give your answer correct to two decimal places.



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