

Math 124 Quiz 2 Winter 2002

Name:

Problem 1.(based on hw problem #56 in Section 1.6 and supplementary problem # 2.)

When a camera flash goes off, the batteries immediately begin to recharge the flash's capacitor. The electric charge at time t (measured in seconds) is $Q(t) = 100(1 - e^{-t/a})$.

(i) (2 points) Calculate the domain and range of the function Q .

(ii) (2 points) Assuming that $a = 1$, draw the graph of the function $Q(t)$ to convince yourself that Q is a one-to-one function in its domain. Show all intermediate graphs.

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(iii) (3 points) Calculate the inverse function that expresses time t as a function of electric charge. (Write down both its domain and range as well.)

Problem 2. (3 points) (based on worksheet and lectures) Suppose a body is dropped from the top of a tower and its distance from the point of drop t seconds later is given by $d(t) = 100 - 5t^2$ ft . At what time would the instantaneous velocity of the body be $\lim_{t \rightarrow 1} \frac{5-5t^2}{t-1}$ ft/sec ? Justify your answer.