

7. [10 points] Given below is a table of values for a **continuous** function  $q(t)$  and its first and second derivative. The question marks indicate values that are not known. For each question mark, the value may or may not exist, but at all other real numbers  $t$ , the values of  $q(t)$ ,  $q'(t)$ , and  $q''(t)$  exist.

$t$	-5	-3	-1	1	3	5	7	9
$q(t)$	1	?	0	?	?	?	?	?
$q'(t)$	?	0	-3	0	1	2	?	-3
$q''(t)$	?	-5	0	2	0	1	?	2

Between any two consecutive values of  $t$  in the table, both  $q'(t)$  and  $q''(t)$  are either **always positive** or **always negative**.

- a. [2 points] Estimate  $q'''(-2)$ . Show your work to justify your answer.

**Answer:**  $q'''(-2) \approx$  \_\_\_\_\_

- b. [1 point] Is  $t = -3$  a local minimum of  $q(t)$ , a local maximum of  $q(t)$ , or is there not enough information to decide (NEI)? Circle **one** answer only. (No justification needed.)

LOCAL MIN

LOCAL MAX

NEI

- c. [2 points] Which of the following values of  $t$  must be inflection points of  $q(t)$ ? Circle **all** correct answers. (No justification needed.)

$t = -3$

$t = -1$

$t = 1$

$t = 3$

NONE OF THESE

- d. [2 points] Which of the following values must be undefined? Circle **all** correct answers. (No justification needed.)

$q'(-5)$

$q'(7)$

$q''(-5)$

$q''(7)$

NONE OF THESE

- e. [3 points] Find the  $t$ -coordinate(s) of the **global minimum(s)** of  $q(t)$  on the interval  $[-5, 5]$ , or write NEI if there is not enough information to determine this. Then, **briefly justify** your answer. You may give a possible sketch of  $q(t)$  on  $[-5, 5]$  as your justification.

**Answer:** Global min(s) at  $t =$  \_\_\_\_\_

**Justification:**