

7. [10 points] Let  $N(u) = \begin{cases} e + 3^{u^2+k} & \text{if } u < 1 \\ 5e \ln(e + u - 1) & \text{if } u \geq 1, \end{cases}$  where  $k$  is a constant.

- a. [6 points] Use the limit definition of the derivative to write an explicit expression for  $N'(-2)$ . Your answer should not involve the letter  $N$ . Do not attempt to evaluate or simplify the limit. Please write your final answer in the answer box provided below.

Answer:  $N'(-2) =$

- b. [4 points] Find all values of  $k$  so that  $N(u)$  is continuous at  $u = 1$ . Show your work carefully, and leave your answer(s) in exact form.

Answer:  $k =$  \_\_\_\_\_

8. [7 points] Suppose  $w$  and  $q$  are continuous and invertible functions. The table below shows many values of  $w$  and  $q^{-1}$  (the inverse of  $q$ ).

$s$	-4.7	-3.3	-1.8	0.7	1.1	1.6	2.1	2.5	4.1	5.2
$w(s)$	4.1	2.5	1.4	0	-0.5	-1.8	-2	-3.1	-3.9	-4.7
$q^{-1}(s)$	-3.7	0.1	0.7	2.5	4.1	5.1	5.2	7.3	9.5	11.3

- a. [2 points] Find  $q^{-1}(w(-4.7))$ .                      b. [2 points] Find  $w(q(0.7))$ .

Answer: \_\_\_\_\_

Answer: \_\_\_\_\_

- c. [3 points] Find the average rate of change of  $q(x)$  between  $x = 0.7$  and  $x = 5.2$ . Be sure to show your work.

Answer: \_\_\_\_\_