

2. [5 points] Let

$$Q(r) = 1 + r^{\ln(r)}.$$

Use the limit definition of the derivative to write an explicit expression for  $Q'(5)$ . *Your answer should not involve the letter  $Q$ . Do not attempt to evaluate or simplify the limit.* Please write your final answer in the answer box provided below.

Answer:  $Q'(5) =$

3. [11 points] Inga, a beekeeper, sets up a new hive on April 1. At two later times, she estimates the hive's population. These estimates are shown in the table below.

weeks after April 1	2	5
population of the hive, in thousands	7.7	10.9

- a. [2 points] Find a formula for a linear function  $L(t)$  modeling the hive's population, in thousands,  $t$  weeks after April 1.

Answer:  $L(t) =$  \_\_\_\_\_

- b. [4 points] Find a formula for an exponential function  $E(t)$  modeling the the hive's population, in thousands,  $t$  weeks after April 1.

Answer:  $E(t) =$  \_\_\_\_\_

*This problem continues on the next page.*