

4. [10 points] A new drug, Lexicor, helps reduce the symptoms of the common cold. Doctors recommend to take Lexicor the moment a patient starts showing symptoms of a cold. Let

$$T(x) = 200 - 150 \log(ax + 3)$$

be the length of time (in hours) needed for the drug to eliminate the common cold symptoms after a dose of  $x$  mg. In this problem  $a$  is a nonzero constant.

- a. [2 points] According to the function  $T(x)$ , how long will it take for the symptoms of the common cold to disappear, after a patient starts showing symptoms of a cold, if he does not take Lexicor? *Include units.*

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

- b. [4 points] List all the transformations, in order, that you need to apply to the graph of the function  $f(x) = 150 \log(x)$  in order to get the graph of the function  $y = T(x)$ . Assume that  $0 < a < 1$ . Make sure to write each transformation carefully.

1) \_\_\_\_\_

2) \_\_\_\_\_

3) \_\_\_\_\_

4) \_\_\_\_\_

- c. [4 points] Find the value of the constant  $a$  if the symptoms of the common cold are eliminated 25 hours after taking a dose of 300 mg of Lexicor. Your answer must be exact or include at least three decimals. Show all your work.

$a =$  \_\_\_\_\_