

10. [10 points] Larry the llama and his family of five love having family game night! They find that the more soda they consume on game night, the more board games they can play. Let  $b(z)$  be the number of board games they play when the family consumes  $z$  ounces of soda. After a few months of family game night, the family finds that

$$b(z) = 3 + 12 \log \left( \frac{z}{p} \right)$$

where  $p$  is a positive constant.

- a. [3 points] If Larry's family wants to play 13.5 board games, how many ounces of soda should they consume? (Your answer may involve  $p$ , but numbers should be in *exact form*.) Show your work carefully.

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

- b. [4 points] *Note: This problem does not depend on part (a) above.* Suppose the family normally drinks  $M$  ounces of soda on game night. How many more board games than usual do they play if they drink 5 times more soda than normal? Show your work carefully. Your final answer should be a number, i.e. should not include any constants like  $p$  or  $M$ . Please round to the nearest 0.1 game.

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

- c. [3 points] *Note: This problem does not depend on parts (a) or (b) above.* Suppose that Larry finds that  $b(64) = 5$ . Use this to solve *exactly* for  $p$ . Show your work carefully.

**Answer:**  $p =$  \_\_\_\_\_