

8. [9 points] A certain company's revenue  $R$  (in thousands of dollars) is given as a function of the amount of money  $a$  (in thousands of dollars) they spend on advertising by  $R = f(a)$ . Suppose that  $f$  is invertible.

a. [2 points] Which of the following is a valid interpretation of the equation  $(f^{-1})'(75) = 0.5$ ? Circle one option.

• If the company spends \$75,000 more on advertising, their revenue will increase by about \$500.

• If the company increases their advertising expenditure from \$75,000 to \$76,000, their revenue will increase by about \$500.

• If the company wants a revenue of \$75,000, they should spend about \$500 on advertising.

• If the company wants to increase their revenue from \$75,000 to \$76,000, they should spend about \$500 more on advertising.

b. [2 points] The company plans to spend about \$100,000 on advertising. If  $f'(100) = 0.5$ , should the company spend more or less than \$100,000 on advertising? Justify your answer.

c. [5 points] The company's financial advisor claims that he has a formula for the dependence of revenue on advertising expenditure, and it is

$$f(a) = a \ln(a + 1).$$

Using this formula, write the *limit definition* of  $f'(100)$ . You do not need to simplify or evaluate.