SHEET #241:
QUESTION 19. (CSV2.4p.92) NAME: KEY Period: _____

- **Unit 2: Understanding the Derivative**

Advertising Expenditures versus Revenue Increase

A company's revenue is a function of advertising expenditures, $R = f(a)$, where R is revenue and a is advertising (each in thousands of dollars).

In each case provide a representative sketch, and answer the question in plain English (be careful to keep units in mind when considering the derivative).

a) What does the company hope is true about $f'(a)$? Why? (org: about the sign Ans: positive)

b) What does the statement $f'(100) = 2$ mean in practical terms? Is this good for the company?

c) What does $f'(100) = .5$ mean? Is this good for the company?

d) Suppose the company budgets approximately \$100,000 for advertising. If $f'(100) = 2$, should they spend more than \$100, 000? What if $f'(100) = .5$?

e) Draw possible graphs of Profit = R − a versus a for $f'(100) = \begin{cases} 0 \\ 0.5 \\ 1 \\ 2 \end{cases}$.

a) Revenue increases when advertising increases and Δ(Revenue) − Δ(advertising cost) > 0. → ΔR > Δa $\frac{\Delta R}{\Delta a} > 1$

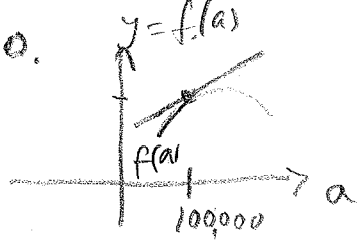
Change in profit = ΔP = ΔR − ΔC = ΔR − Δa − (Δ other costs)

should be positive.

$f'(a) > 1$ Certainly positive

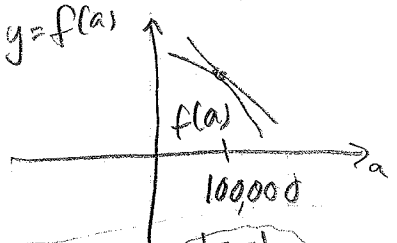
b) $f'(100) = 2$ means that for every \$1 spent on advertising, revenue increases by \$2, when advertising expenditures are \$100,000. Profit increases by \$1, a GAIN

c) $f'(100) = 0.5$ means \$1 spent leads to \$0.50 increase in revenue. Profit will be \$0.50 LOSS



d) Let a = 100,000. If $f'(100) = 2$, they should spend more (by how much?).

If $f'(100) = 0.5$ they should spend less (by how much?)



e) Draw graphs of Profit = Revenue − Cost versus a for $f'(100) = \begin{cases} 0 \\ 0.5 \\ 1 \\ 2 \end{cases}$