

Math 122 Sections 2.4-2.5 Study Guide

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1 Section 2.4

Problem 1) For each of the following functions, determine all intervals where the function is concave up and all the intervals where the function is concave down.

(a) $f(x) = 3x^5 - 5x^3 + 3$.

(b) $g(x) = e^x - x$.

(c) $h(x) = -x^2 + 3x + 5$.

Problem 2) A function $f(x)$ has $f(5) = 20$, $f'(5) = 2$, and $f''(x) < 0$ when $x \geq 5$. Which values of $f(7)$ are impossible? Justify your answer.

(a) $x = 26$;

(b) $x = 24$;

(c) $x = 22$.

Problem 3) Let $P(t)$ represent the price of a share of stock of a corporation at time t . What does each of the following statements tell us about the first and second derivatives of $P(t)$.

(a) The price of a stock is rising faster and faster.

(b) The price of a stock is close to bottoming out.

2 Section 2.5

Problem 4) For q units, the company's revenue function is $R(q)$ and the cost function is $C(q)$. Suppose $R(500) = 9400$ and $C(500) = 7200$. Next, suppose $C'(500) = 15$ and $R'(500) = 20$.

(a) Determine $\pi(500)$. Is it profitable for the company to produce $q = 500$ units of the good?

(b) Estimate the change in profit if the company increased from 500 to 501 units.

Problem 5) Let $C(q)$ be the cost function of producing q units of a good. Suppose $C(15) = 2300$, and the marginal cost of producing $q = 15$ units is 108.

(a) Estimate the total cost of producing $q = 16$ units.

(b) Estimate the total cost of producing $q = 14$ units.

Problem 6) A company's cost of producing q units of a good is $C(q)$; the quantity can be sold for $R(q)$ thousand dollars. Suppose $C(2000) = 5930$ and $R(2000) = 7780$.

(a) Determine the profit at $q = 2000$.

(b) If $C'(2000) = 2.1$ and $R'(2000) = 3.5$, should the company increase or decrease production from $q = 2000$? Justify.

(c) Estimate the change in profit from producing $q = 2000$ to $q = 2001$ units of the good.