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Relative vs. Absolute extrema.

Ex1: Find all extrema of $f(x) = x^3 - x^2 - x$ on $[-\frac{1}{2}, 2]$

soln: $f'(x) = 3x^2 - 2x - 1 = (3x+1)(x-1)$

critical values @ $x = -\frac{1}{3}$ and $x = 1$.

$f''(x) = 6x - 2$ $\quad f''(-\frac{1}{3}) < 0$ and $f''(1) > 0$

rel max. rel. min

$f(-\frac{1}{2}) = \frac{1}{8}$ $\quad f(-\frac{1}{3}) = \frac{5}{27}$ $\quad f(1) = -1$ $\quad f(2) = 2$

Abs. min abs. max.

Ex2: A firm has a total rev. given by $R(x) = 2800x - 8x^2 - x^3$ for a product. Find & interp the max rev. given that at most 30 of the units will be produced.

Ex3: If the math society charges $5 admission to a lecture, 1000 people will attend. For each $1 increase in price, 100 fewer people will attend?

Ex4: If the total cost for a product is $C(x) = (x+5)^3$ dollars, find the minimum average cost.

note: [redacted] show the min takes place when $\overline{C}(x) = MC$

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Ex5: A product can be produced for $C(x) = 800 + 100x^2 + x^3$ (x = # of units). The Rev. is $R(x) = 60000x - 50x^2$. Find & interp the max profit.

Ex6: A travel agency will plan a tour for groups of 25 or more. It costs \$500/person for a grp of 25. However, it costs \$10/person less above 25. If it costs the agency \$125/pp what is the size of the most profitable group?