$\lim_{x \to \infty} \int_2^3 \frac{1}{dx} dy$

RELATIVE EXTREMA AND FIRST DERIVATIVE TEST

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Problem 1:

Given $f(x) = 2x^3 + x^2 - 20x + 4$ with domain $(-\infty, \infty)$, find

- the coordinates of any relative maximum and minimum points on the graph of the function.
- the intervals over which the function is increasing and decreasing

Problem 2:

Given $f(x) = x^{2/3} - 1$ with domain $(-\infty, \infty)$, find

- the coordinates of any relative maximum and minimum points on the graph of the function.
- the intervals over which the function is increasing and decreasing

Problem 3:

Given $f(x) = \sqrt[3]{x^2 - x - 2}$ with domain $(-\infty, \infty)$, find

- the coordinates of any relative maximum and minimum points on the graph of the function.
- the intervals over which the function is increasing and decreasing.

Problem 4:

Given $f(x) = x\sqrt{9 - x^2}$ with domain $[-3, 3]$, find

- the coordinates of any relative maximum and minimum points on the graph of the function.
- the intervals over which the function is increasing and decreasing.

Problem 5:

Given $f(x) = x\sqrt{2} - 2\cos x$ with restricted domain $[-2\pi, 2\pi]$, find

- the x-coordinates ONLY of any relative maximum and minimum points on the graph of the function.
- the intervals over which the function is increasing and decreasing.

Problem 6:

Given $f(x)=(x+2)^3-4$ with domain $(-\infty,\infty)$, find

- the coordinates of any relative maximum and minimum points on the graph of the function.
- the intervals over which the function is increasing and decreasing.

SOLUTIONS
You can find detailed solutions below the link for this problem set!

1. Relative Maximum at $[-2,f(-2)]=(-2,32)$ Relative Minimum at $[\frac{5}{3},f(\frac{5}{3})]=(\frac{5}{3},\frac{-467}{27})$ Intervals of Increase are $(-\infty,-2)$ and $(\frac{5}{3},\infty)$ Interval of Decrease is $(-2,\frac{5}{3})$	2. NO Relative Maximum Relative Minimum at $[0,f(0)]=(0,-1)$ Interval of Increase is $(0,\infty)$ Interval of Decrease is $(-\infty,0)$
3. NO Relative Maximum Relative Minimum at $[\frac{1}{2},f(\frac{1}{2})]=(\frac{1}{2},-\sqrt[3]{\frac{9}{4}})$ Intervals of Increase are $(\frac{1}{2},2)$ and $(2,\infty)$ Intervals of Decrease are $(-\infty,-1)$ and $(-1,\frac{1}{2})$	4. Relative Maximum at $[\frac{3\sqrt{2}}{2},f(\frac{3\sqrt{2}}{2})]=(\frac{3\sqrt{2}}{2},\frac{9}{2})$ Relative Minimum at $[-\frac{3\sqrt{2}}{2},f(-\frac{3\sqrt{2}}{2})]=(-\frac{3\sqrt{2}}{2},-\frac{9}{2})$ Interval of Increase is $(-\frac{3\sqrt{2}}{2},\frac{3\sqrt{2}}{2})$ Intervals of Decrease are $(-3,-\frac{3\sqrt{2}}{2})$ and $(\frac{3\sqrt{2}}{2},3)$
5. x- coordinates of Relative Maximum: $\frac{-3\pi}{4}$ and $\frac{5\pi}{4}$ x- coordinates of Relative Minimum: $\frac{-\pi}{4}$ and $\frac{7\pi}{4}$ Intervals of Increase are $\left[-2\pi,\frac{-3\pi}{4}\right)$, $\left(\frac{-\pi}{4},\frac{5\pi}{4}\right)$, and $\left(\frac{7\pi}{4},2\pi\right]$ Intervals of Decrease are $\left(\frac{-3\pi}{4},\frac{-\pi}{4}\right)$ and $\left(\frac{5\pi}{4},\frac{7\pi}{4}\right)$	6. NO Relative Maximum No Relative Minimum Intervals of Increase are $(-\infty,-2)$ and $(-2,\infty)$. No Intervals of Decrease