4.5 Graph Sketching

Friday, November 25, 2016 11:45 AM

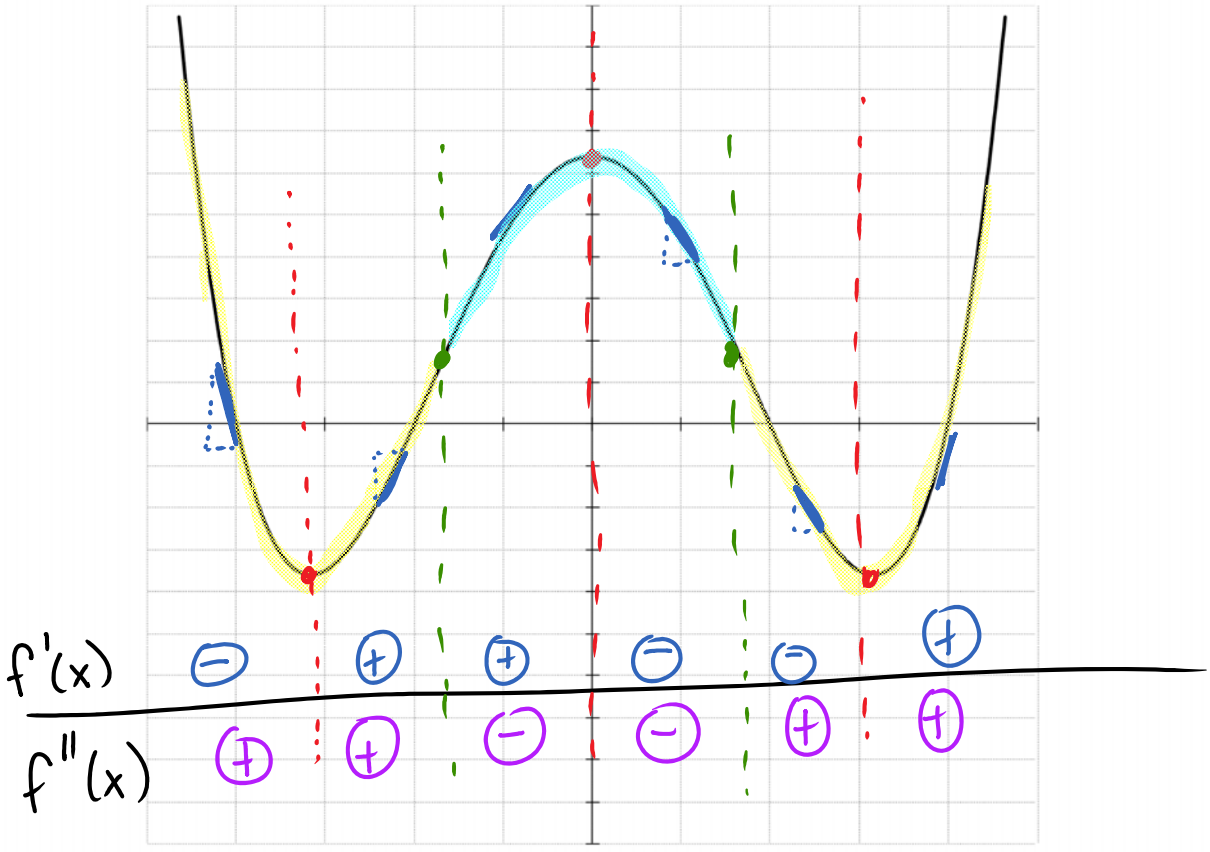
AP Calculus

4.5 Graph Sketching

Using the graph of $f(x)$ below locate the relative maximums, relative minimums and inflection points.

Determine the signs (positive or negative) for $f'(x)$ and $f''(x)$

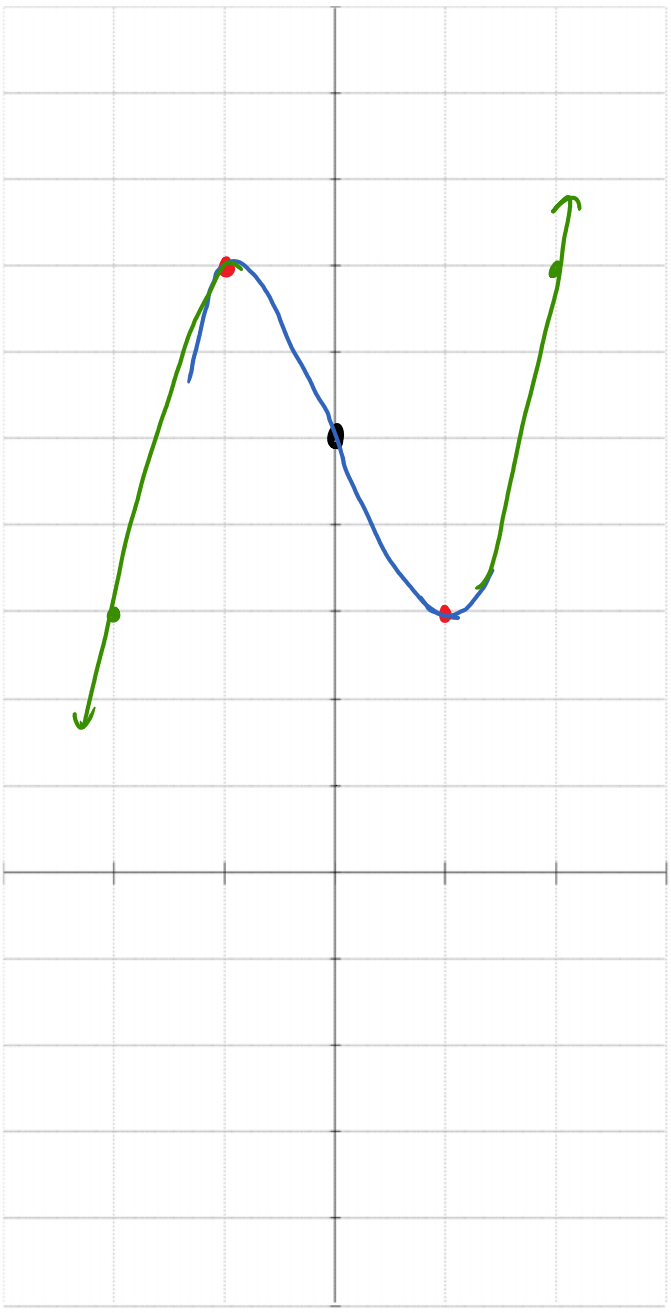
Make conclusions from your results to justify the location of the extrema and inflection points.



Example #1

Graph $f(x) = x^3 - 3x + 5$

x-intercepts	Y-intercept
$0 = x^3 - 3x + 5$ No integer x-intercepts	constant term $(0, 5)$
End Behaviour	**Asymptotes**
up into Quad ① Down into Quad ③	None
First Derivative	**Sign Chart**
$f'(x) = 3x^2 - 3$ $0 = 3x^2 - 3$ $0 = 3(x^2 - 1)$ $x = 1 \quad x = -1$	$(-\infty, -1)\ (-1, 1)\ (1, \infty)$ $x = -2 \quad x = 0 \quad x = 2$ sign of $f'(x)$: ⊕ ⊖ ⊕ Max at $x = -1$ $f(-1) = 7$ Min in $x = 1$ $f(1) = 3$
Second Derivative	**Sign Chart**
$f''(x) = 6x$ $6x = 0$ $x = 0$	$(-\infty, 0)\ (0, \infty)$ $x = -1 \quad x = 1$ sign of $f''(x)$: ⊖ ⊕ ⊖ concave down ⊕ conc ave up $f(0) = 5$ $(0, 5)$ inflection point



$f(2) = 7$

$f(-2) = 3$

$$f(x) = \frac{2(x^2 - 9)}{x^2 - 4}$$