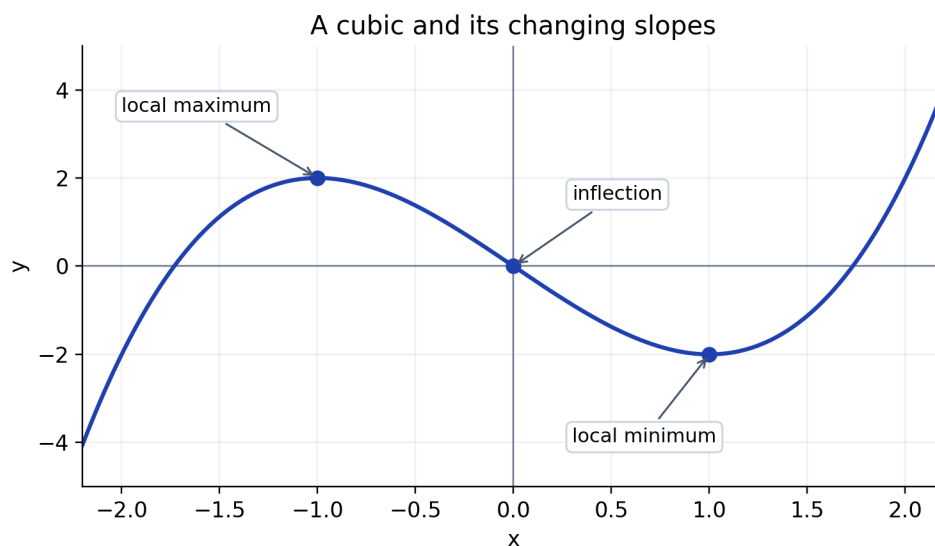


Lesson 3.3 · Worked solutions

Show the method, check hypotheses, and justify your conclusion.

1. Analyze direction and concavity for $f(x) = x^3 - 3x$. Locate local extrema and the inflection point.

Solution. The first derivative is $3(x^2 - 1)$: increase on $(-\infty, -1)$ and $(1, \infty)$, decrease on $(-1, 1)$. Local maximum is $(-1, 2)$ and local minimum is $(1, -2)$. The second derivative is $6x$, so the graph is concave down for $x < 0$, up for $x > 0$, with inflection at $(0, 0)$.



Local maximum is (minus 1, 2), local minimum is (1, minus 2), with inflection at the origin.

2. If f' is positive and decreasing on an interval, describe f .

Solution. The function increases because its derivative is positive. Its slopes decrease, so it is concave down where this derivative behavior holds.

Lesson 3.3 · Worked solutions

Show the method, check hypotheses, and justify your conclusion.

3. Does $f''(0) = 0$ prove an inflection point? Use $f(x) = x^4$.

Solution. No. Here $f''(x) = 12x^2$ is positive on either side of 0. Concavity does not change, so 0 is not an inflection input.

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