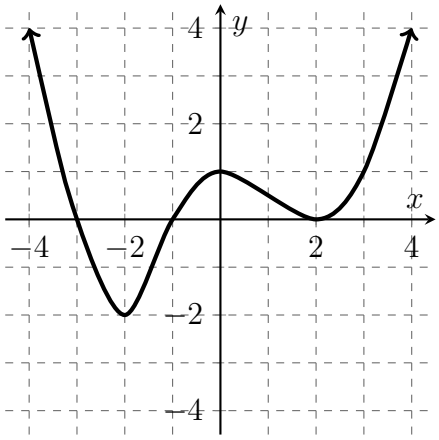
SECTION 4.5: DERIVATIVES AND THE SHAPE OF THE GRAPH (DAY 2)

1. The Second Derivative Test

2. Use the Second Derivative Test to find the local extrema for $f(x) = -3x^5 + 5x^3$.

3. For the function $f(x) = \sqrt[3]{x}(8 - x)$, determine (a) intervals where f is increasing/decreasing, (b) the locations of any local extrema, (c) intervals where f is concave up / concave down, and (d) inflection points. Then use technology to confirm your answers.
   NOTE: $f'(x) = \dfrac{-4(x-2)}{3x^{2/3}}$ and $f''(x) = \dfrac{-4(x+4)}{9x^{5/3}}$

4. Below is the graph of the *derivative* of f, $f'(x)$. Use this graph to answer the questions.



(a) On what intervals is $f(x)$ increasing? decreasing?

(b) Determine the location of local extrema of f.

(c) On what intervals is $f(x)$ concave up? concave down?

(d) Determine the location of any inflection points of f.

5. Sketch a graph that satisfies *all* of the properties below.

(a) $f(2) = f(4) = 0$
(b) $f'(x) > 0$ if $x < 3$
(c) $f'(3)$ does not exist
(d) $f'(x) < 0$ if $x > 3$
(e) $f''(x) > 0$ for $x \neq 3$.