5.5 Determine Absolute Extrema from Candidates
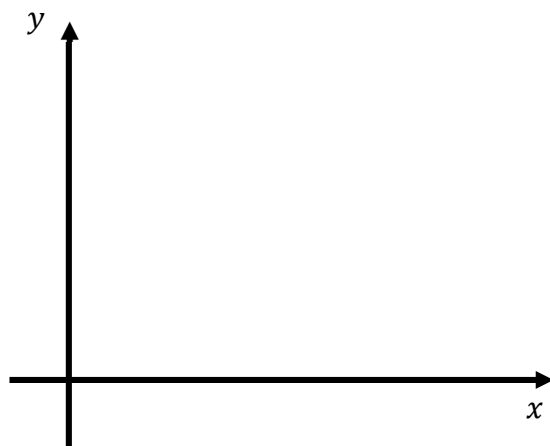
y

x

The critical points give us possibilities of finding a max or min. The ends of the interval (the endpoints), give us other possibilities of finding a max or min.

Candidates for Absolute Extrema (on an interval)

1.

2.

1. Find the absolute maximum value and the absolute minimum value of the function $f(x) = x^3 - 3x^2 + 1$ on the interval $\left[-\frac{1}{2}, 4\right]$. Remember to show that you checked ALL the candidates.

2. Looking at the graph of f', we can identify relative extrema at the x-intercepts. Can you find the x-coordinate of the ABSOLUTE maximum and the ABSOLUTE minimum?

$f'(x)$
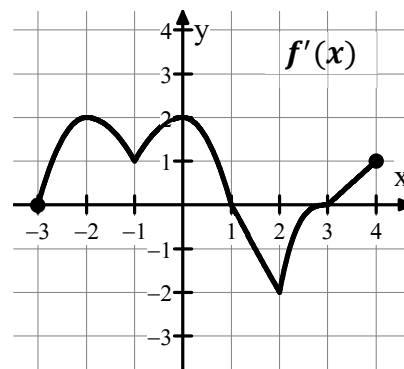
5.5 Determine Absolute Extrema from Candidates
Calculus

Find the absolute maximum value and the absolute minimum value of the function on the given interval.
Remember to show that you checked ALL the candidates.

1. $f(x) = 1 + (x + 1)^2$, $[-2, 5]$

2. $f(x) = 2x^3 + 3x^2 + 4$ $[-2, 1]$
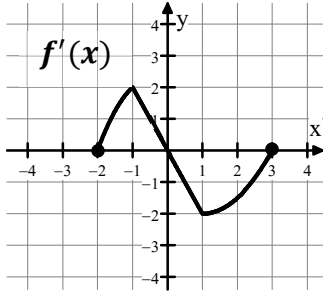
3. $f(x) = \frac{x}{x^2+1}$, $[-2, 2]$

4. $f(x) = \sin\left(x + \frac{\pi}{4}\right)$, $\left[0, \frac{7\pi}{4}\right]$

5. $g(x) = xe^{2x}$, $[-1, 1]$

6. $f(x) = x^3 + 2x^2 + x - 5$ $[-2, 2]$

The graph of f', the derivative of f, is shown for each problem. At what x-value does f have an absolute maximum and absolute minimum?
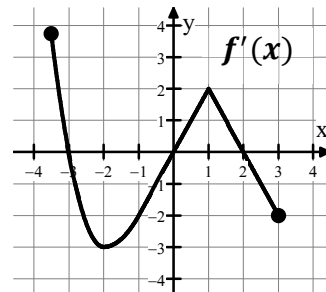
7. Domain: $-2 \le x \le 3$

$f'(x)$

Absolute **max** at $x =$____

Absolute **min** at $x =$____

8. Domain: $-3.5 \le x \le 3$

$f'(x)$

Absolute **max** at $x =$____

Absolute **min** at $x =$____

5.5 Determine Absolute Extrema from Candidates

Test Prep

9. **No calculator** allowed for this problem. Let f be the function defined by $f(x) = \cos^2 x - \cos x$ for $0 \le x \le \frac{3\pi}{2}$. Find the absolute maximum value and the absolute minimum value of f.

10. Consider the function $f(x) = \begin{cases} x^2, & 0 \le x < 1 \\ 0, & 1 \le x \le 2 \end{cases}$. Which of the following is true?

   (A) f attains an absolute maximum value of 1.

   (B) f attains an absolute minimum value of 0.

   (C) f attains an absolute maximum value of 1 somewhere on the interval $[0, 2]$.

   (D) f does not attain an absolute minimum value.

   (E) Both (A) and (C).

11. A particle moves along the y-axis so that its velocity at time t, $0 \le t \le 6$, is given by $v(t) = 2(t-2)(t-5)$. Find the minimum velocity of the particle.

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12. A particle moves along the x-axis with position at time t given by $x(t) = e^{-t} \cos t$ for $0 \le t \le 2\pi$. Find the time t at which the particle is farthest to the right.

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11. Find the maximum acceleration attained on the interval $0 \le t \le 3$ by the particle whose velocity is given by $v(t) = \frac{2}{3}t^3 - 4t^2 + 8t - 2$.