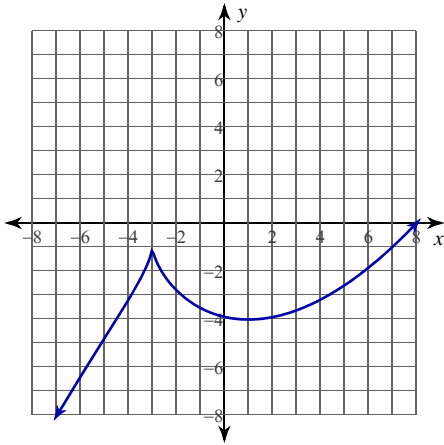


Extrema, Increase and Decrease

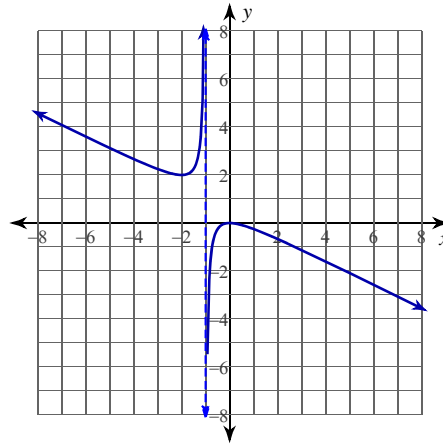
Date _____ Period _____

Approximate the relative extrema of each function.

1)



2)

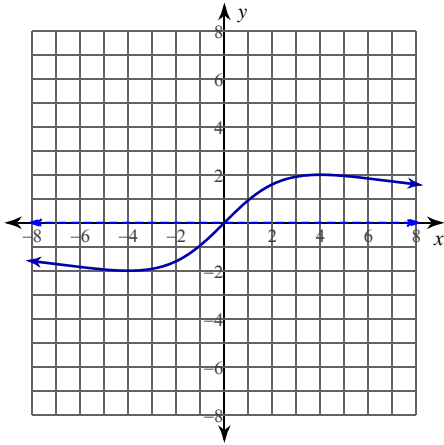
**Use a graphing calculator to approximate the relative extrema of each function.**

3) $y = -x^3 + 4x^2 - 4$

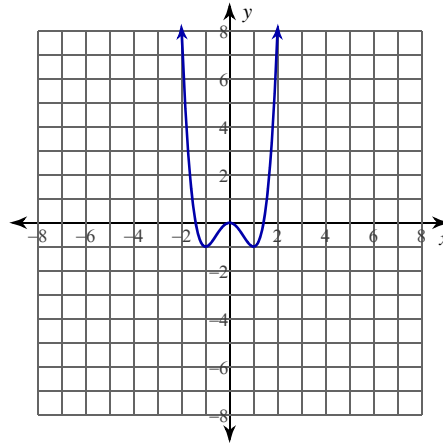
4) $y = \frac{x^2}{4x + 4}$

Approximate the intervals where each function is increasing and decreasing.

5)



6)

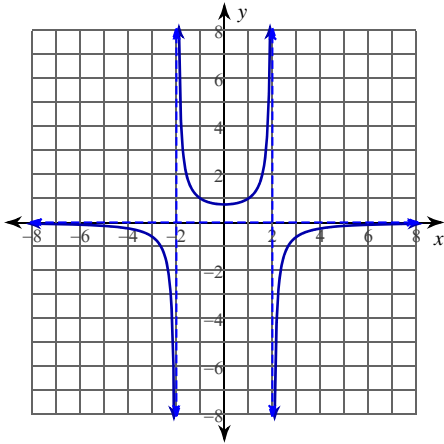
**Use a graphing calculator to approximate the intervals where each function is increasing and decreasing.**

7) $y = x^4 - 2x^2 - 3$

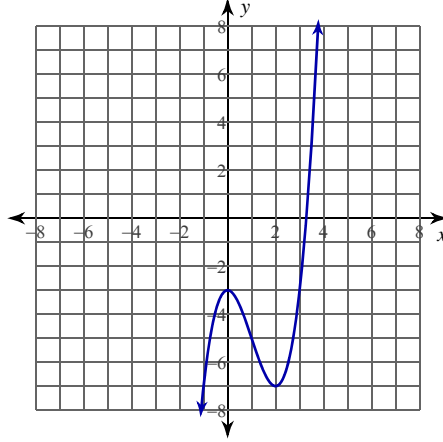
8) $y = -\frac{2}{x^2 - 1}$

Approximate the relative and absolute extrema of each function. Then approximate the intervals where each function is increasing and decreasing.

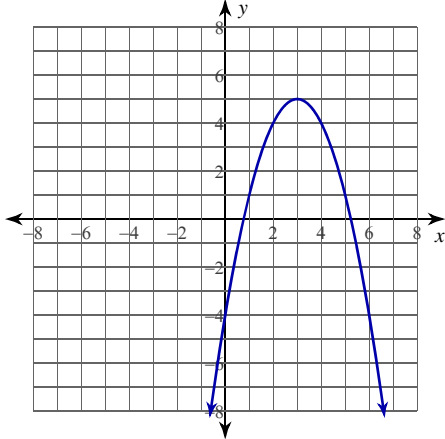
9) $y = -\frac{3}{x^2 - 4}$



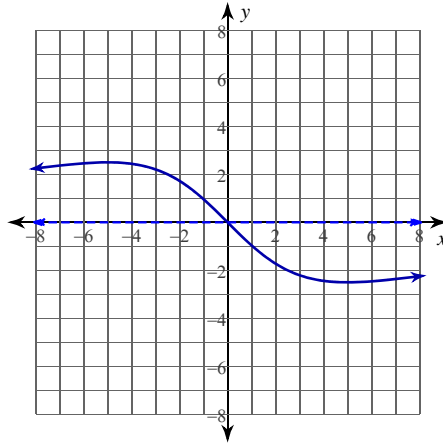
10) $y = x^3 - 3x^2 - 3$



11) $y = -x^2 + 6x - 4$



12) $y = -\frac{25x}{x^2 + 25}$



Critical thinking questions:

13) Write a function that has the following relative maximums: (1, 1), (2, 2), (3, 3).

14) Is it possible for a continuous function to have only the following extrema?

Relative max: (1, 1), (3, 3)

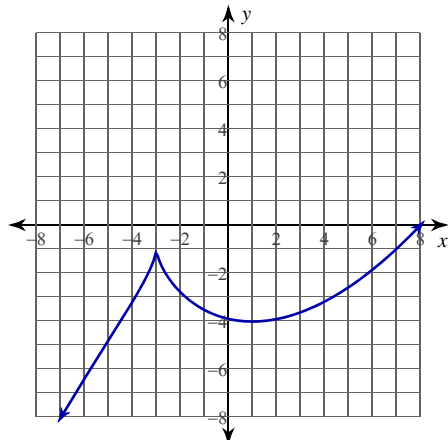
Relative min: (2, 2)

Explain why or why not.

Extrema, Increase and Decrease

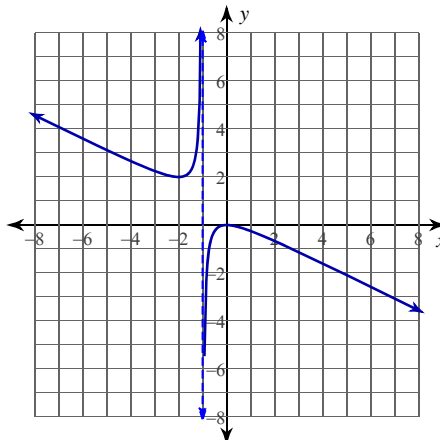
Approximate the relative extrema of each function.

1)



Relative minimum: $(1, -4)$
Relative maximum: $(-3, -1)$

2)



Relative minimum: $(-2, 2)$
Relative maximum: $(0, 0)$

Use a graphing calculator to approximate the relative extrema of each function.

3) $y = -x^3 + 4x^2 - 4$

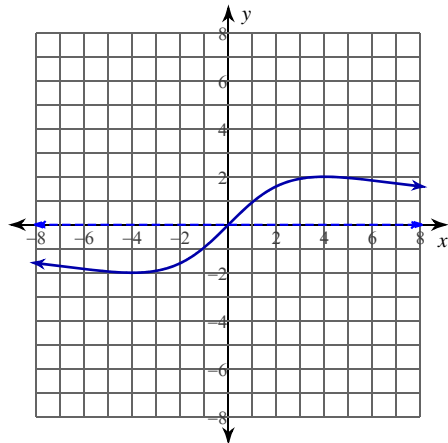
Relative minimum: $(0, -4)$
Relative maximum: $(2.7, 5.5)$

4) $y = \frac{x^2}{4x + 4}$

Relative minimum: $(0, 0)$
Relative maximum: $(-2, -1)$

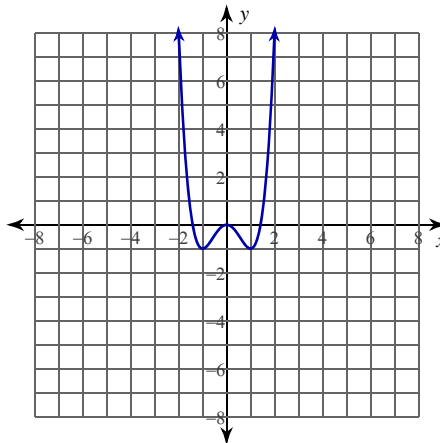
Approximate the intervals where each function is increasing and decreasing.

5)



Increasing: $(-4, 4)$ Decreasing: $(-\infty, -4), (4, \infty)$

6)



Increasing: $(-1, 0), (1, \infty)$ Decreasing: $(-\infty, -1), (0, 1)$

Use a graphing calculator to approximate the intervals where each function is increasing and decreasing.

7) $y = x^4 - 2x^2 - 3$

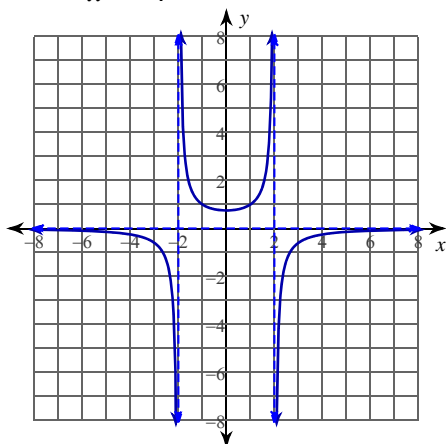
Increasing: $(-1, 0), (1, \infty)$ Decreasing: $(-\infty, -1), (0, 1)$

8) $y = -\frac{2}{x^2 - 1}$

Increasing: $(0, 1), (1, \infty)$ Decreasing: $(-\infty, -1), (-1, 0)$

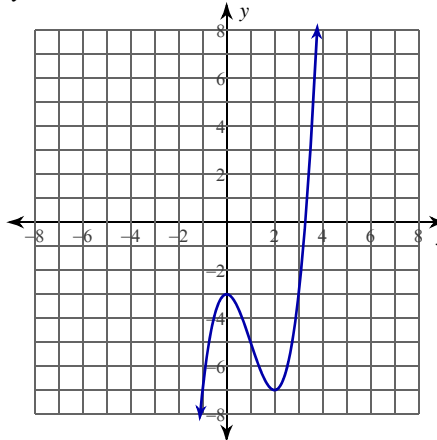
Approximate the relative and absolute extrema of each function. Then approximate the intervals where each function is increasing and decreasing.

9) $y = -\frac{3}{x^2 - 4}$



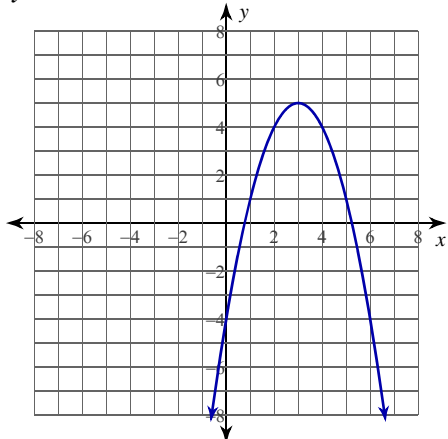
Relative minimum: (0, 0.8)
 No absolute or relative maxima.
 Increasing: (0, 2), (2, ∞) Decreasing: (−∞, −2), (−2, 0)

10) $y = x^3 - 3x^2 - 3$



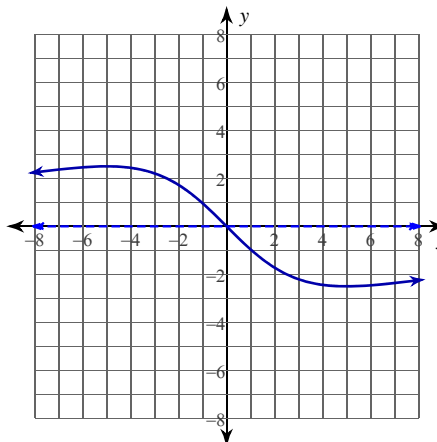
Relative minimum: (2, −7)
 Relative maximum: (0, −3)
 Increasing: (−∞, 0), (2, ∞) Decreasing: (0, 2)

11) $y = -x^2 + 6x - 4$



No absolute or relative minima.
 Absolute maximum: (3, 5)
 Increasing: (−∞, 3) Decreasing: (3, ∞)

12) $y = -\frac{25x}{x^2 + 25}$



Absolute minimum: (5, −2.5)
 Absolute maximum: (−5, 2.5)
 Increasing: (−∞, −5), (5, ∞) Decreasing: (−5, 5)

Critical thinking questions:

13) Write a function that has the following relative maximums: (1, 1), (2, 2), (3, 3).

$y = -10(x - 1)^2 \cdot (x - 2)^2 \cdot (x - 3)^2 + x$

14) Is it possible for a continuous function to have only the following extrema?

Relative max: (1, 1), (3, 3)

Relative min: (2, 2)

Explain why or why not.

No, the function can't be decreasing to the right of $x = 1$ and decreasing just left of $x = 2$ yet jump from $y = 1$ to $y = 2$ with no periods of increase without being discontinuous.