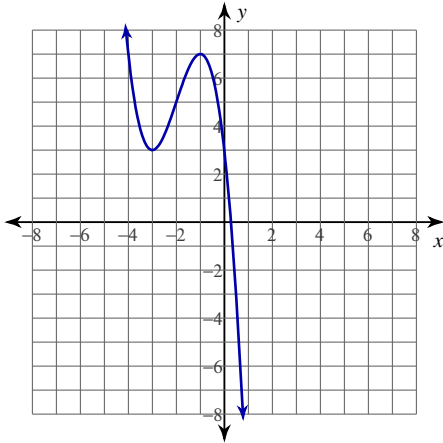


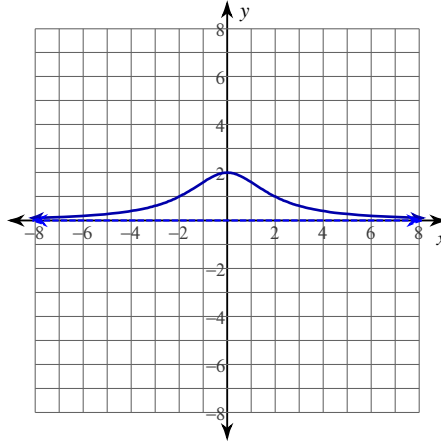
## Absolute Extrema

For each problem, find all points of absolute minima and maxima on the given closed interval.

1)  $y = -x^3 - 6x^2 - 9x + 3$ ;  $[-3, -1]$



2)  $y = \frac{8}{x^2 + 4}$ ;  $[0, 5]$



3)  $y = x^3 + 6x^2 + 9x + 3$ ;  $[-4, 0]$

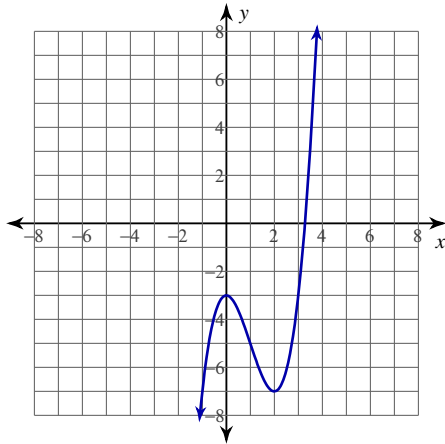
4)  $y = x^4 - 3x^2 + 4$ ;  $[-1, 1]$

5)  $y = \frac{x^2}{3x - 6}$ ;  $[3, 6]$

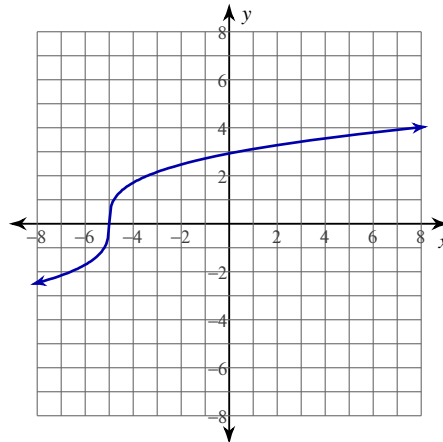
6)  $y = (x + 2)^{\frac{2}{3}}$ ;  $[-4, -2]$

For each problem, find all points of absolute minima and maxima on the given interval.

7)  $y = x^3 - 3x^2 - 3$ ;  $(0, 3)$



8)  $y = (5x + 25)^{\frac{1}{3}}$ ;  $[-2, 2]$



9)  $y = x^3 - 3x^2 + 6$ ;  $[0, \infty)$

10)  $y = x^4 - 2x^2 - 3$ ;  $(0, \infty)$

11)  $y = \frac{4}{x^2 + 2}$ ;  $(-5, -2]$

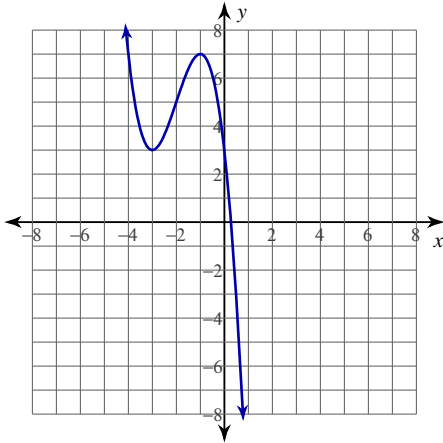
12)  $y = -\frac{1}{6}(x+1)^{\frac{7}{3}} + \frac{14}{3}(x+1)^{\frac{1}{3}}$ ;  $(-5, 0)$

## Absolute Extrema

Date \_\_\_\_\_ Period \_\_\_\_\_

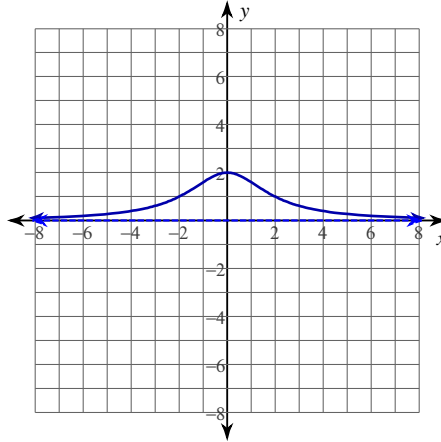
For each problem, find all points of absolute minima and maxima on the given closed interval.

1)  $y = -x^3 - 6x^2 - 9x + 3$ ;  $[-3, -1]$



Absolute minimum:  $(-3, 3)$   
 Absolute maximum:  $(-1, 7)$

2)  $y = \frac{8}{x^2 + 4}$ ;  $[0, 5]$



Absolute minimum:  $(5, \frac{8}{29})$   
 Absolute maximum:  $(0, 2)$

3)  $y = x^3 + 6x^2 + 9x + 3$ ;  $[-4, 0]$

Absolute minima:  $(-4, -1), (-1, -1)$   
 Absolute maxima:  $(0, 3), (-3, 3)$

4)  $y = x^4 - 3x^2 + 4$ ;  $[-1, 1]$

Absolute minima:  $(-1, 2), (1, 2)$   
 Absolute maximum:  $(0, 4)$

5)  $y = \frac{x^2}{3x - 6}$ ;  $[3, 6]$

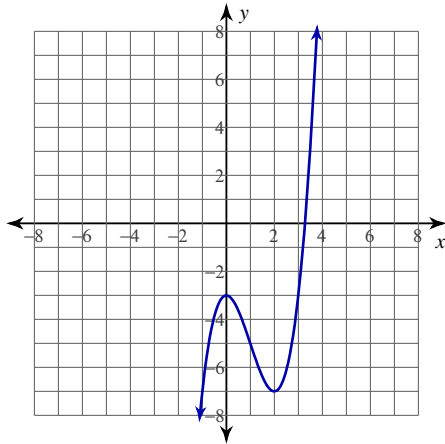
Absolute minimum:  $(4, \frac{8}{3})$   
 Absolute maxima:  $(3, 3), (6, 3)$

6)  $y = (x + 2)^{\frac{2}{3}}$ ;  $[-4, -2]$

Absolute minimum:  $(-2, 0)$   
 Absolute maximum:  $(-4, \sqrt[3]{4})$

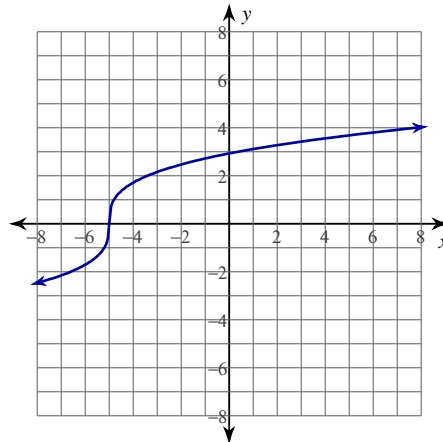
For each problem, find all points of absolute minima and maxima on the given interval.

7)  $y = x^3 - 3x^2 - 3$ ;  $(0, 3)$



Absolute minimum:  $(2, -7)$   
No absolute maxima.

8)  $y = (5x + 25)^{\frac{1}{3}}$ ;  $[-2, 2]$



Absolute minimum:  $(-2, \sqrt[3]{15})$   
Absolute maximum:  $(2, \sqrt[3]{35})$

9)  $y = x^3 - 3x^2 + 6$ ;  $[0, \infty)$

Absolute minimum:  $(2, 2)$   
No absolute maxima.

10)  $y = x^4 - 2x^2 - 3$ ;  $(0, \infty)$

Absolute minimum:  $(1, -4)$   
No absolute maxima.

11)  $y = \frac{4}{x^2 + 2}$ ;  $(-5, -2]$

No absolute minima.  
Absolute maximum:  $(-2, \frac{2}{3})$

12)  $y = -\frac{1}{6}(x+1)^{\frac{7}{3}} + \frac{14}{3}(x+1)^{\frac{1}{3}}$ ;  $(-5, 0)$

Absolute minimum:  $(-3, -4\sqrt[3]{2})$   
No absolute maxima.