WebAssign
4.1 Extremos Relativos y Absolutos (Homework)

David Corzo
Diferencial, section B, Spring 2019
Instructor: Christiaan Ketelaar

Current Score : 29 / 25 **Due :** Saturday, April 27, 2019 11:59 PM CST**Last Saved : n/a Saving... ()**

The due date for this assignment is past. Your work can be viewed below, but no changes can be made.

Important! Before you view the answer key, decide whether or not you plan to request an extension. Your Instructor may *not* grant you an extension if you have viewed the answer key. Automatic extensions are not granted if you have viewed the answer key.

Request Extension

1. 2.5/2.5 points | Previous AnswersSCalcET8 4.1.003.

For each of the numbers *a*, *b*, *c*, *d*, *r*, and *s*, state whether the function whose graph is shown has an absolute maximum or minimum, a local maximum or minimum, or neither a maximum nor a minimum. (Enter your answers as a comma-separated list.)

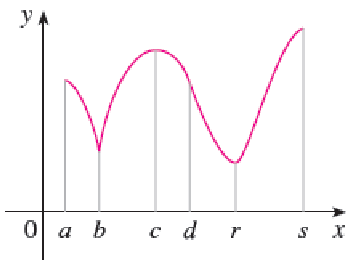
absolute maximum $$*s*
s

absolute minimum $$*r*
r

local maximum $$*c*
c

local minimum $$*b*,*r*
b, r

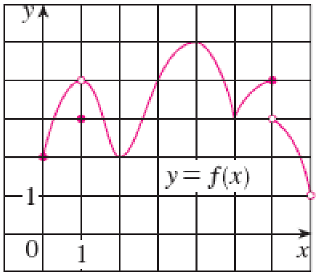
neither a maximum nor a minimum $$*a*,*d*
a, d



Solution or Explanation
Absolute maximum at *s*, absolute minimum at *r*, local maximum at *c*, local minima at *b* and *r*, neither a maximum nor a minimum at *a* and *d*.

2. 2/2 points | Previous AnswersSCalcET8 4.1.005.

Use the graph to state the absolute and local maximum and minimum values of the function. (Assume each point lies on the gridlines. Enter your answers as a comma-separated list. If an answer does not exist, enter DNE.)



absolute maximum value $$5

$\boxed{5}$

absolute minimum value $$*DNE*

$\boxed{DNE}$

local maximum value(s) $$4,5

$\boxed{5, 4}$

local minimum value(s) $$2,3

$\boxed{2, 3}$

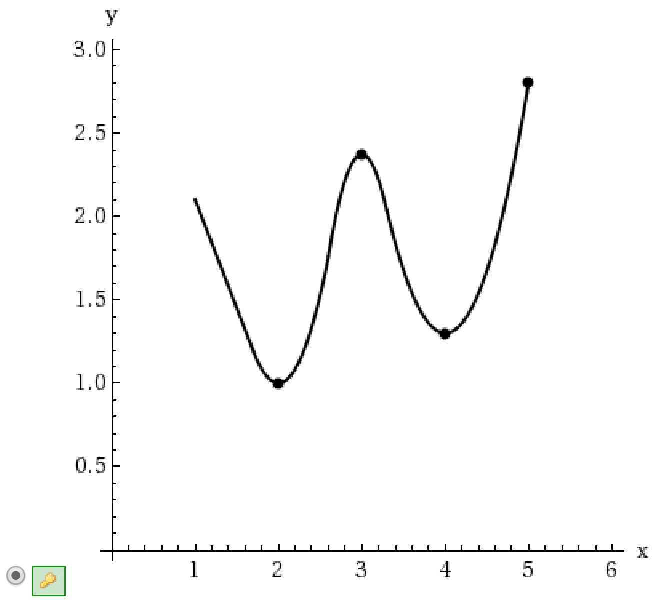
Solution or Explanation

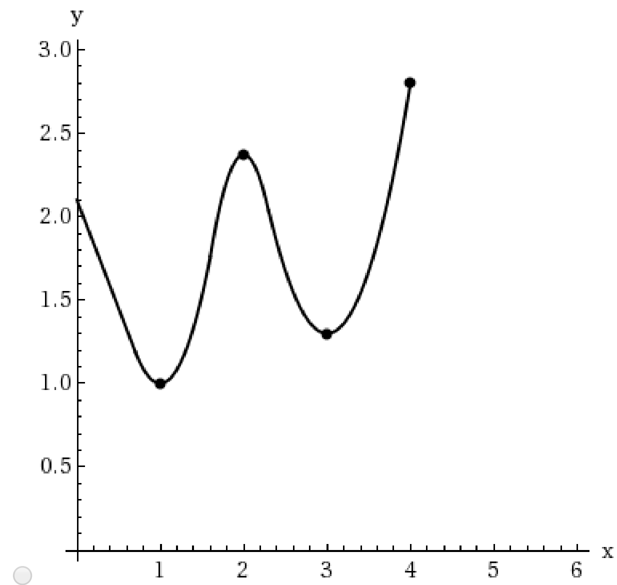
Absolute maximum value is $f(4) = 5$; there is no absolute minimum value; local maximum values are $f(4) = 5$ and $f(6) = 4$; local minimum values are $f(2) = 2$ and $f(1) = f(5) = 3$.

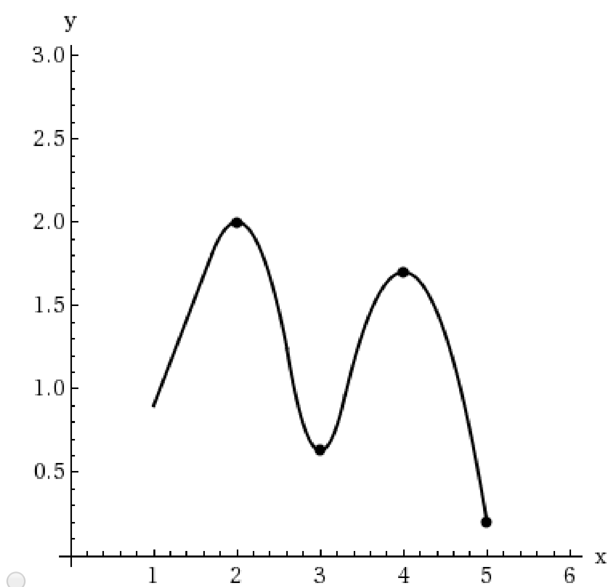
3. 1/1 points | Previous AnswersSCalcET8 4.1.007.

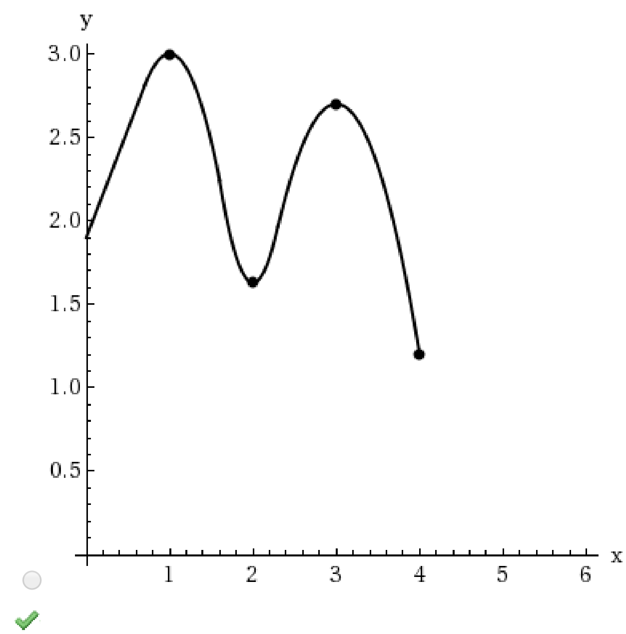
Sketch the graph of a function *f* that is continuous on [1, 5] and has the given properties.

Absolute maximum at 5, absolute minimum at 2, local maximum at 3, local minima at 2 and 4



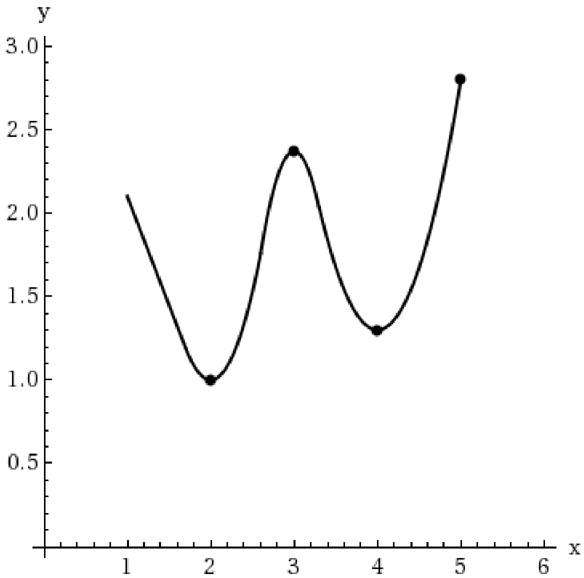






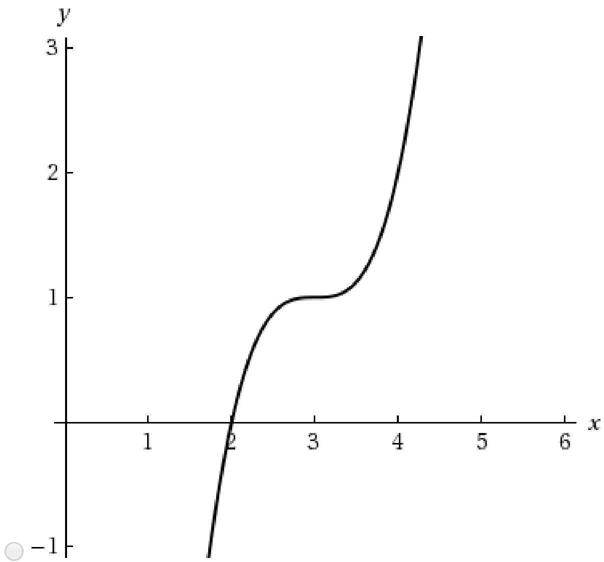
Solution or Explanation

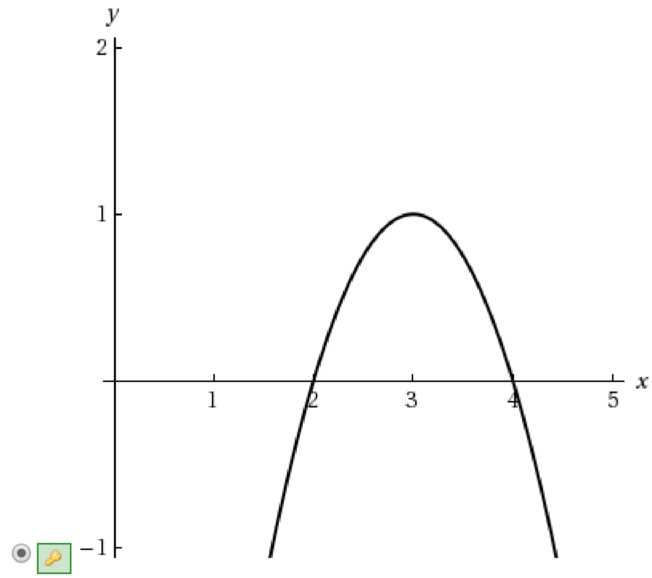
Absolute maximum at 5, absolute minimum at 2, local maximum at 3, local minima at 2 and 4

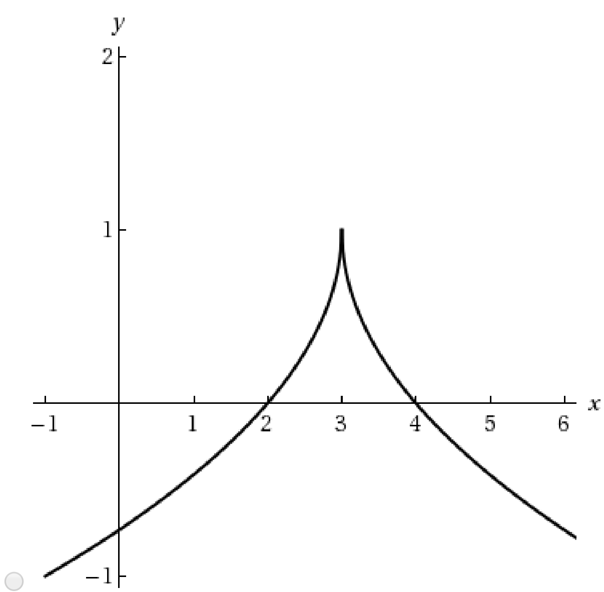

y
3.0
2.5
2.0
1.5
1.0
0.5
1
2
3
4
5
6
x

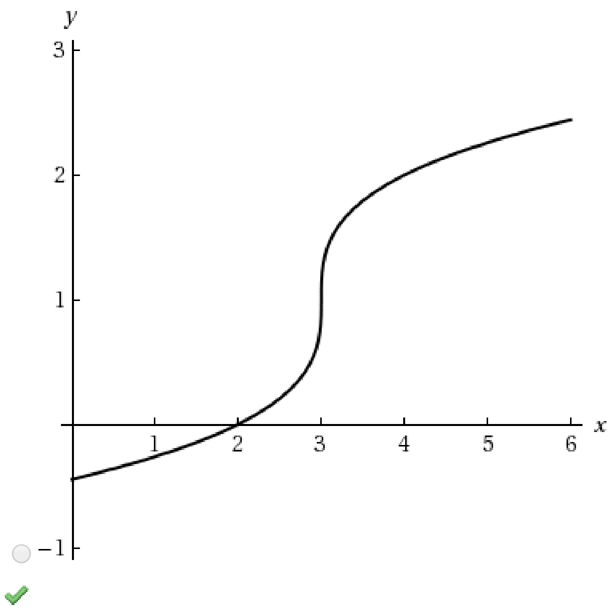
4. 1.5/1.5 points | Previous Answers SCalcET8 4.1.011.

(a) Sketch the graph of a function that has a local maximum at 3 and is differentiable at 3.

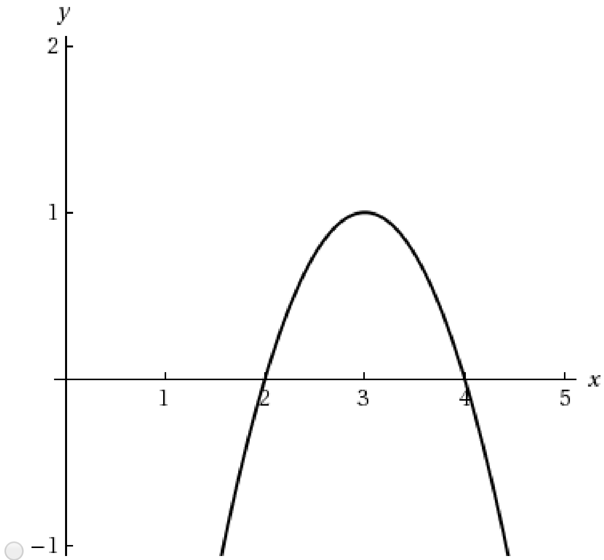


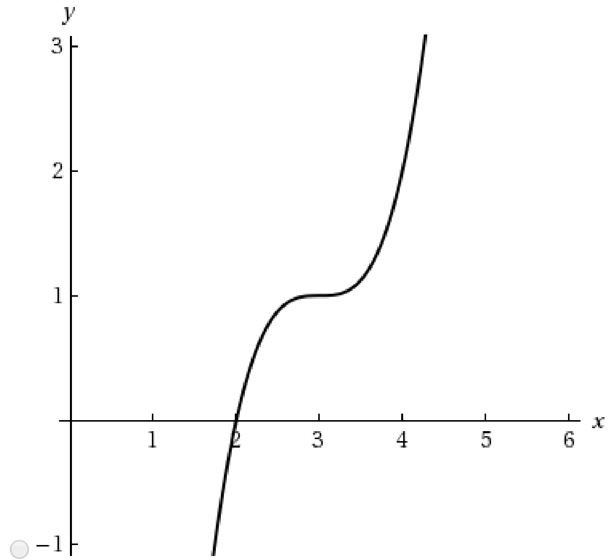


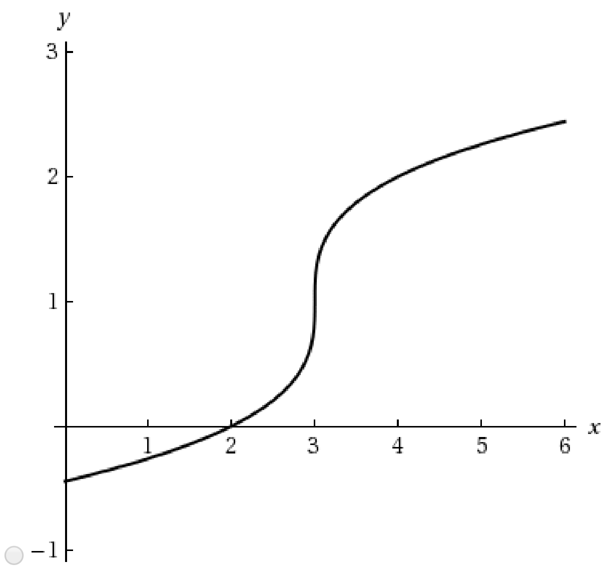


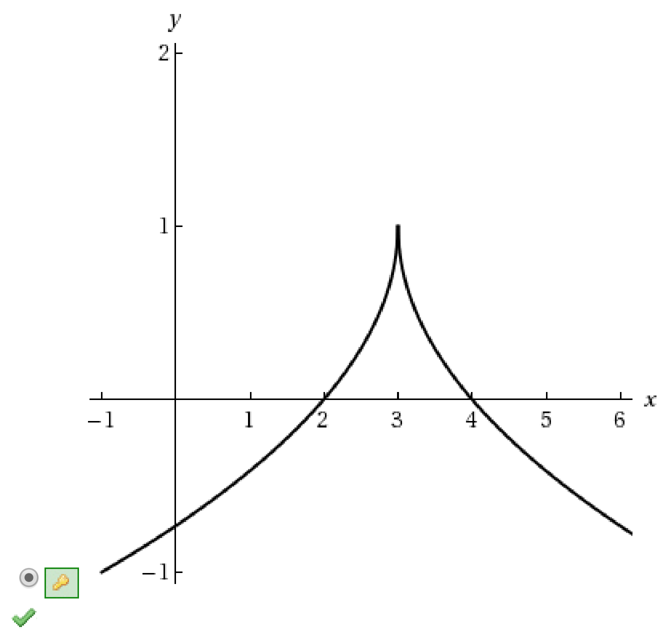


(b) Sketch the graph of a function that has a local maximum at 3 and is continuous but not differentiable at 3.

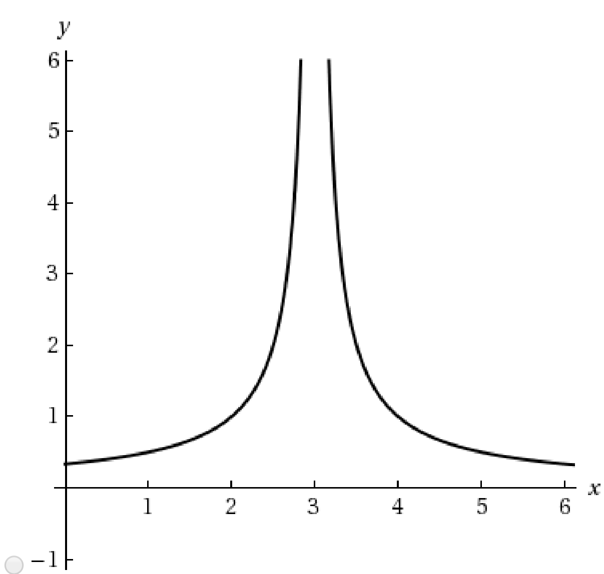


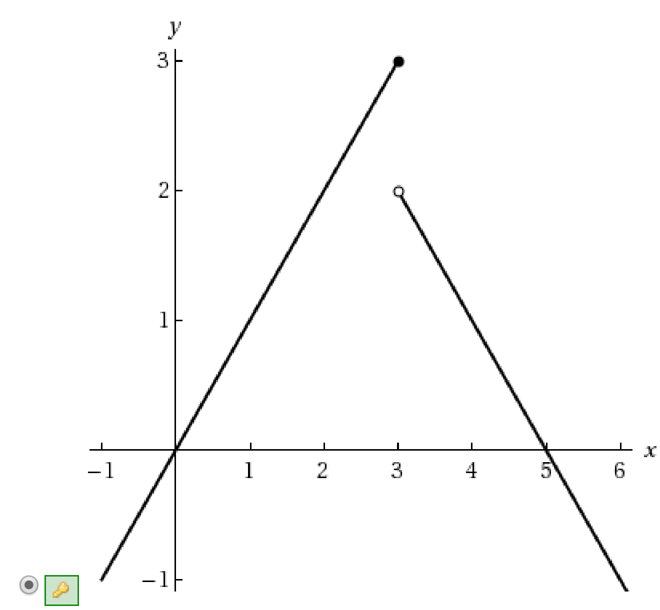


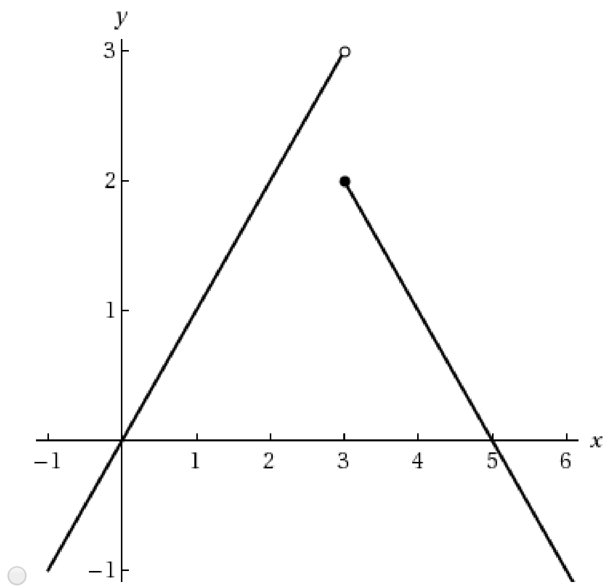


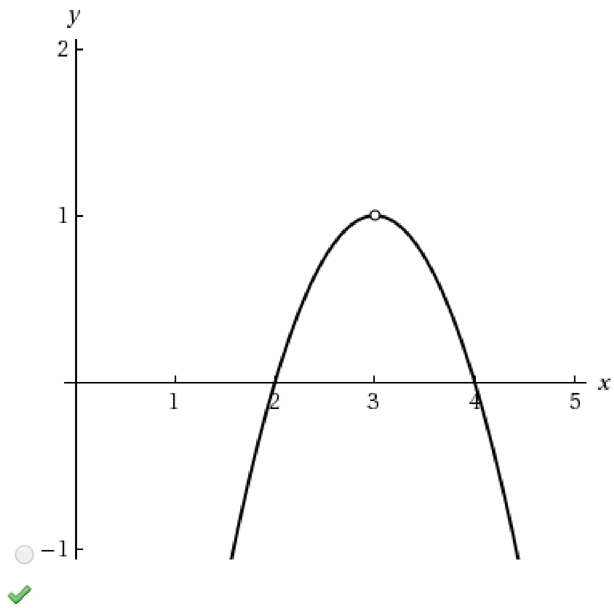


(c) Sketch the graph of a function that has a local maximum at 3 and is not continuous at 3.



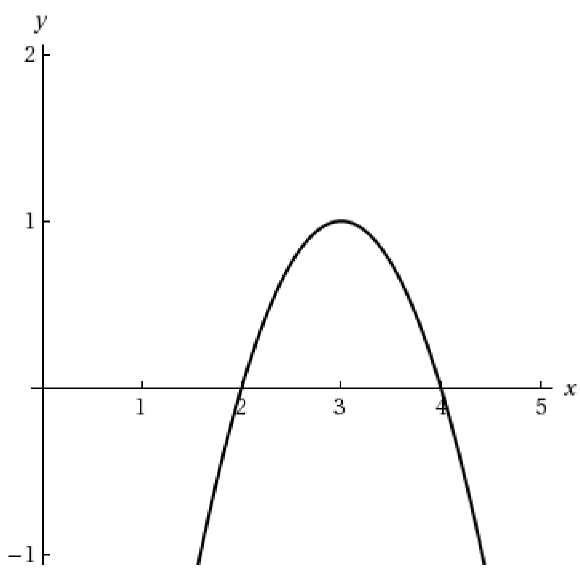




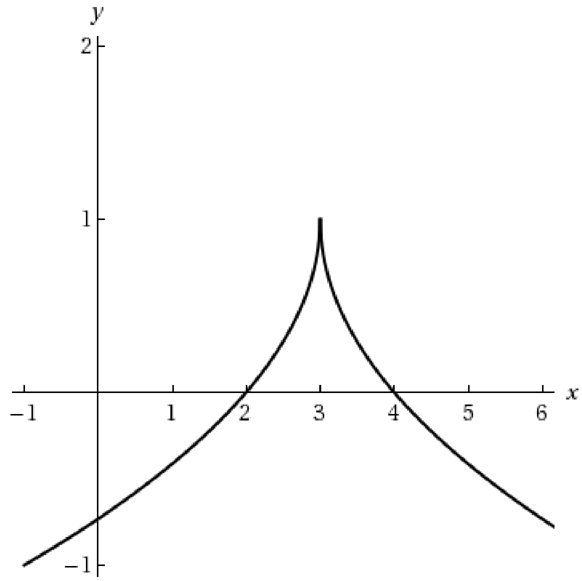


Solution or Explanation

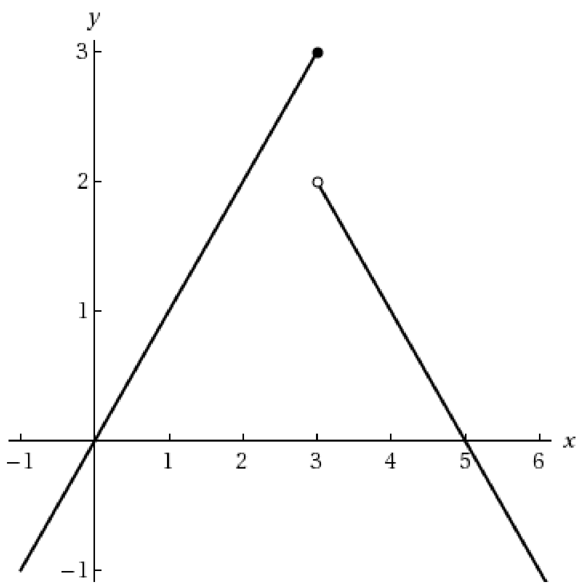
(a)



(b)



(c)



5. 2/2 points | Previous AnswersSCalcET8 4.1.017.

Sketch the graph of f by hand and use your sketch to find the absolute and local maximum and minimum values of f. (Enter your answers as a comma-separated list. If an answer does not exist, enter DNE.)

$$f(x) = \frac{2}{x}, \quad x \geq 2$$

$$1

absolute maximum value

$\boxed{1}$

$$DNE

absolute minimum value

$\boxed{\text{DNE}}$

$$DNE

local maximum value(s)

$\boxed{\text{DNE}}$

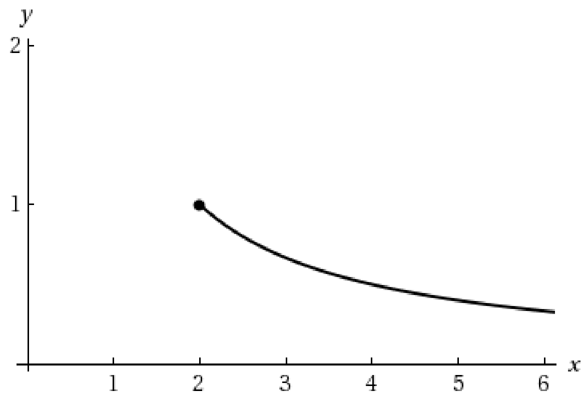
$$DNE

local minimum value(s)

$\boxed{\text{DNE}}$

Solution or Explanation

$f(x) = \frac{2}{x}, \quad x \geq 2$. Absolute maximum $f(2) = 1$; no local maximum. No absolute or local minimum.



6. 2/2 points | Previous AnswersSCalcET8 4.1.022.

Sketch the graph of f by hand and use your sketch to find the absolute and local maximum and minimum values of f. (Enter your answers as a comma-separated list. If an answer does not exist, enter DNE.)

$f(t) = 9\cos(t), \quad -3\pi/2 \le t \le 3\pi/2$

absolute maximum value $$9

9

absolute minimum value $$−9

-9

local maximum value(s) $$9

9

local minimum value(s) $$−9

-9

Solution or Explanation

Click to View Solution

7. 1/1 points | Previous AnswersSCalcET8 4.1.030.

Find the critical numbers of the function. (Enter your answers as a comma-separated list. If an answer does not exist, enter DNE.)

$f(x) = x^3 + 12x^2 - 27x$

$x =$

$$−9,1

$1, -9$

Solution or Explanation

$f(x) = x^3 + 12x^2 - 27x \quad \Rightarrow \quad f'(x) = 3x^2 + 24x - 27 = 3(x^2 + 8x - 9) = 3(x + 9)(x - 1)$. $f'(x) = 0 \quad \Leftrightarrow \quad x = 1, -9$. These are the only critical numbers.

8. 2/0 points | Previous AnswersSCalcET8 4.1.027.

Sketch the graph of f by hand and use your sketch to find the absolute and local maximum and minimum values of f. (Enter your answers as a comma-separated list. If an answer does not exist, enter DNE.)

$$f(x) = \begin{cases} x^2 & \text{if } -1 \leq x \leq 0 \\ 8 - 9x & \text{if } 0 < x \leq 1 \end{cases}$$

$$DNE

absolute maximum value

$\boxed{\text{DNE}}$

$$−1

absolute minimum value

$\boxed{-1}$

$$DNE

local maximum value(s)

$\boxed{\text{DNE}}$

$$0

local minimum value(s)

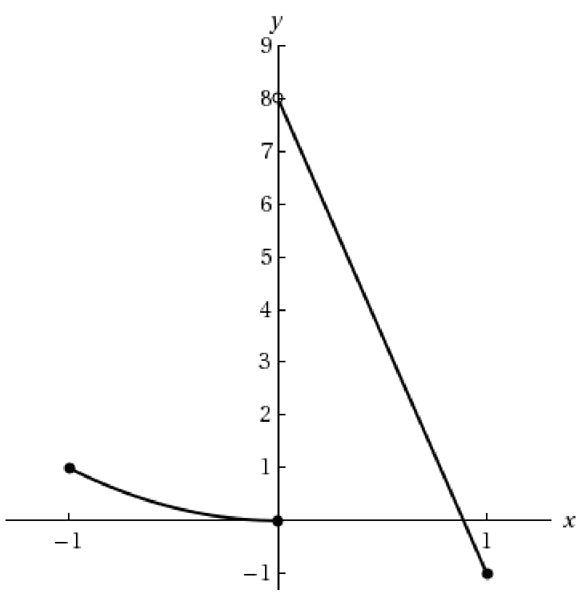
$\boxed{0}$

Solution or Explanation

$$f(x) = \begin{cases} x^2 & \text{if } -1 \leq x \leq 0 \\ 8 - 9x & \text{if } 0 < x \leq 1 \end{cases}$$

No absolute or local maximum.

Local minimum $f(0) = 0$.
Absolute minimum $f(1) = -1$.



9. 1/1 points | Previous AnswersSCalcET8 4.1.037.MI.

Find the critical numbers of the function. (Enter your answers as a comma-separated list. If an answer does not exist, enter DNE.)

$h(t) = t^{3/4} - 6t^{1/4}$

$$0,4

t =

$0, 4$

Solution or Explanation

Click to View Solution

10. 1/0 points | Previous AnswersSCalcET8 4.1.041.

Find the critical numbers of the function. (Enter your answers as a comma-separated list. Use n to denote any arbitrary integer values. If an answer does not exist, enter DNE.)

$f(\theta) = 10\cos(\theta) + 5\sin^2(\theta)$

$$nπ,2nπ

θ =

πn

Solution or Explanation

Click to View Solution

11. 1/1 points | Previous AnswersSCalcET8 4.1.043.

Find the critical numbers of the function. (Enter your answers as a comma-separated list. If an answer does not exist, enter DNE.)

$f(x) = x^6 e^{-7x}$

$$0,67

x =

$0, \frac{6}{7}$

Solution or Explanation

Click to View Solution

12. 1/1 points | Previous AnswersSCalcET8 4.1.047.

Find the absolute maximum and absolute minimum values of f on the given interval.

$f(x) = 17 + 2x - x^2, \quad [0, 5]$

$$2

absolute minimum value

2

$$18

absolute maximum value

18

Solution or Explanation

$f(x) = 17 + 2x - x^2, \quad [0, 5]. \quad f'(x) = 2 - 2x = 0 \quad \Leftrightarrow \quad x = 1. \quad f(0) = 17, \quad f(1) = 18,$ and $f(5) = 2$. So $f(1) = 18$ is the absolute maximum value and $f(5) = 2$ is the absolute minimum value.

13.2/2 points | Previous AnswersSCalcET8 4.1.054.

Find the absolute maximum and absolute minimum values of f on the given interval.

$$f(x) = \frac{x}{x^2 - x + 1}, \quad [0, 3]$$

$$0

absolute minimum value

$\boxed{0}$

$$1

absolute maximum value

$\boxed{1}$

Solution or Explanation

$f(x) = \dfrac{x}{x^2 - x + 1}$, $[0, 3]$. $f'(x) = \dfrac{(x^2 - x + 1) - x(2x - 1)}{(x^2 - x + 1)^2} = \dfrac{x^2 - x + 1 - 2x^2 + x}{(x^2 - x + 1)^2} = \dfrac{1 - x^2}{(x^2 - x + 1)^2} = 0 \Leftrightarrow x = \pm 1$, but $x = -1$ is not in the given interval, $[0, 3]$. $f(0) = 0$, $f(1) = 1$, and $f(3) = \frac{3}{7}$. So $f(1) = 1$ is the absolute maximum value and $f(0) = 0$ is the absolute minimum value.

14.2/2 points | Previous AnswersSCalcET8 4.1.057.

Find the absolute maximum and absolute minimum values of f on the given interval.

$$f(t) = 2\cos(t) + \sin(2t), \quad [0, \pi/2]$$

$$0

absolute minimum value

$\boxed{0}$

$$√3+√32

absolute maximum value

$\boxed{\dfrac{3\sqrt{3}}{2}}$

Solution or Explanation

$f(t) = 2\cos(t) + \sin(2t), \quad [0, \pi/2]$.

$f'(t) = -2\sin(t) + \cos(2t) \cdot 2 = -2\sin(t) + 2(1 - 2\sin^2(t)) = -2(2\sin^2(t) + \sin(t) - 1) = -2(2\sin(t) - 1)(\sin(t) + 1)$.

$f'(t) = 0 \Rightarrow \sin(t) = \frac{1}{2}$ or $\sin(t) = -1 \Rightarrow t = \frac{\pi}{6}$. $f(0) = 2$, $f\left(\frac{\pi}{6}\right) = \sqrt{3} + \frac{1}{2}\sqrt{3} = \frac{3}{2}\sqrt{3} \approx 2.60$, and $f\left(\frac{\pi}{2}\right) = 0$.

So $f\left(\frac{\pi}{6}\right) = \frac{3}{2}\sqrt{3}$ is the absolute maximum value and $f\left(\frac{\pi}{2}\right) = 0$ is the absolute minimum value.

15. 1/1 points | Previous Answers SCalcET8 4.1.053.

Find the absolute maximum and absolute minimum values of f on the given interval.

$$f(x) = x + \frac{25}{x}, \quad [0.2, 20]$$

$$10

absolute minimum value

$\boxed{10}$

$$125.2

absolute maximum value

$\boxed{125.2}$

Solution or Explanation

$f(x) = x + \frac{25}{x}$, $[0.2, 20]$. $f'(x) = 1 - \frac{25}{x^2} = \frac{(x+5)(x-5)}{x^2} = 0 \Leftrightarrow x = \pm 5$, but $x = -5$ is not in the given interval, $[0,2, 20]$. $f'(x)$ does not exist when $x = 0$, but 0 is not in the given interval, so 5 is the only critical number. $f(0.2) = 125.2$, $f(5) = 10$, and $f(20) = 21.25$. So $f(0.2) = 125.2$ is the maximum value and $f(5) = 10$ is the absolute minimum value.

---

16. 1/0 points | Previous Answers SCalcET8 4.1.061.

Find the absolute maximum and absolute minimum values of f on the given interval.

$$f(x) = \ln(x^2 + 3x + 12), \quad [-2, 1]$$

$$ln(394)

absolute minimum value

$\boxed{\ln\left(\frac{39}{4}\right)}$

$$ln(16)

absolute maximum value

$\boxed{\ln(16)}$

Solution or Explanation

$f(x) = \ln(x^2 + 3x + 12)$, $[-2, 1]$. $f'(x) = \frac{1}{x^2 + 3x + 12} \cdot (2x + 3) = 0 \Leftrightarrow x = -\frac{3}{2}$. Since $x^2 + 3x + 12 > 0$ for all x, the domain of f and f' is $\mathbb{R}$. $f(-2) = \ln 10 \approx 2.303$, $f\left(-\frac{3}{2}\right) = \ln \frac{39}{4} \approx 2.277$, and $f(1) = \ln 16 \approx 2.773$. So $f(1) = \ln 16 \approx 2.773$ is the absolute maximum value and $f\left(-\frac{3}{2}\right) = \ln \frac{39}{4} \approx 2.277$ is the absolute minimum value.

---

17. 1/1 points | Previous Answers SCalcET8 4.1.503.XP.

Find the critical numbers of the function. (Enter your answers as a comma-separated list. If an answer does not exist, enter DNE.)

$$g(x) = x^{1/9} - x^{-8/9}$$

$$−8

$x =$

$\boxed{-8}$

Solution or Explanation

Click to View Solution

18. 2/2 points | Previous Answers SCalcET8 4.1.505.XP.

Find the absolute maximum and absolute minimum values of f on the given interval.

$f(t) = t\sqrt{16 - t^2}, \quad [-1, 4]$

$$−√15

absolute minimum value

$\boxed{-\sqrt{15}}$

$$8

absolute maximum value

$\boxed{8}$

Solution or Explanation

$f(t) = t\sqrt{16 - t^2}, \quad [-1, 4].$

$f'(t) = t \cdot \frac{1}{2}(16 - t^2)^{-1/2}(-2t) + (16 - t^2)^{1/2} \cdot 1 = \frac{-t^2}{\sqrt{16 - t^2}} + \sqrt{16 - t^2} = \frac{-t^2 + (16 - t^2)}{\sqrt{16 - t^2}} = \frac{16 - 2t^2}{\sqrt{16 - t^2}}.$

$f'(t) = 0 \Rightarrow 16 - 2t^2 = 0 \Rightarrow t^2 = 8 \Rightarrow t = \pm\sqrt{8}$, but $t = -\sqrt{8}$ is not in the given interval, $[-1, 4]$.

$f'(t)$ does not exist if $16 - t^2 = 0 \Rightarrow t = \pm 4$, but -4 is not in the given interval. $f(-1) = -\sqrt{15}$, $f(\sqrt{8}) = 8$, and $f(4) = 0$. So $f(\sqrt{8}) = 8$ is the absolute maximum value and $f(-1) = -\sqrt{15}$ is the absolute minimum value.

19. 2/2 points | Previous Answers SCalcET8 4.1.510.XP.

Find the absolute minimum and absolute maximum values of f on the given interval.

$f(x) = x - \ln(5x), \quad \left[\frac{1}{2}, 2\right]$

$$1−ln(5)

absolute minimum

$\boxed{1 - \ln(5)}$

$$2−ln(10)

absolute maximum

$\boxed{2 - \ln(10)}$

Solution or Explanation

Click to View Solution