Module 6 Problem Set

Due Feb 21 by 9:59pm   **Points** 15   **Submitting** an external tool
Available Feb 14 at 10pm - Mar 20 at 9:59pm about 1 month

Review Assessment Attempts

Uber, Jacques

Module 6 Problem Set

Started: 2/17/21, 5:43 pm
Last Changed: 2/18/21, 8:04 pm
Total time questions were on-screen: 1560.4 minutes

Due Date: Sun 2/21/21, 9:59 pm

Score in Gradebook: 15/15

Grade is calculated on the best version of each question

 Scored attempt. Score: **15/15**.

Question 1.   Version 2*/2. Score: **1/1** ▼

Consider the function $f(x) = x^4 - 32x^2 + 2, \quad -3 \leq x \leq 9$.

The absolute maximum of $f(x)$ on the given interval occurs at $x =$ [9] ⚲

The absolute maximum of $f(x)$ on the given interval is [3971] ⚲

The absolute minimum of $f(x)$ on the given interval occurs at $x =$ | 4 | ⚷

The absolute minimum of $f(x)$ on the given interval is | -254 | ⚷

Score: 0.25/0.25 0.25/0.25 0.25/0.25 0.25/0.25
Time spent on this version: 2.2 minutes.
✉ Message instructor

Question 2.   Version 3*/3. Score: **1/1** ▾

The below function has one local max and one local min. Use the first derivative test to find where they occur.

$$f(x) = 2x^3 + 15x^2 + 24x - 1$$

The local max of $f(x)$ occurs at $x =$ | -4 | ⚷

The local min of $f(x)$ occurs at $x =$ | -1 | ⚷
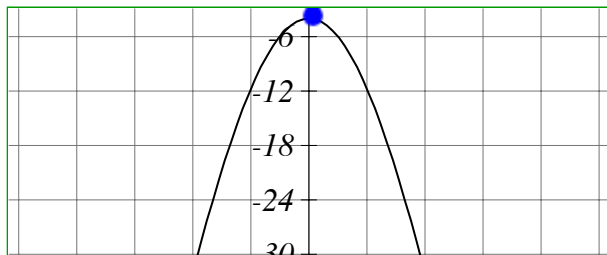

Score: 0.5/0.5 0.5/0.5
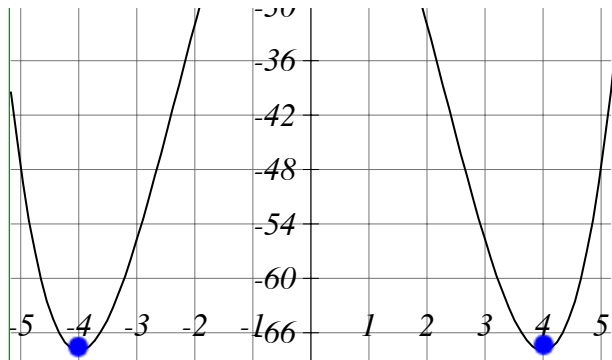Time spent on this version: 0.6 minutes.
✉ Message instructor

Question 3.   Version 1*/1. Score: **1/1**

Mark the critical points on the following graph.

Score: 1/1
Time spent on this version: 0.4 minutes.
✉ Message instructor

Question 4.   Version 1*/1. Score: **1/1**

Consider the function ` f(x) = -3x^2+30x+2` on the interval ` [ 3 , 7 ] `. Evaluate this function at the endpoints of the interval.

`f(3) = `   65   ✆

`f(7) = `   65   ✆

Does Rolle's Theorem apply to `f` on this interval?

⦿ Yes

◯ No

✆ ✔

If Rolle's Theorem applies, find `c` in `(3, 7)` such that `f'(c) = 0`. If Rolle's Theorem does not apply, enter "DNE".

c =   5   ⚬ᵒ

Score: 0.25/0.25 0.25/0.25 0.25/0.25 0.25/0.25
Time spent on this version: 31.7 minutes.
✉ Message instructor

Question 5.   Version 1*/1. Score: **1/1**

Consider the function ` f(x) = 8 \sqrt ( x) + 1 ` on the interval ` [ 3 , 10 ] `. Find the average or mean slope of the function on this interval.

1.6345   ⚬ᵒ   Round your answer to four decimal places as needed.

By the Mean Value Theorem, we know there exists a ` c ` in the open interval ` ( 3 , 10 ) ` such that ` f'( c) ` is equal to this mean slope. For this problem, there is only one ` c ` that works. Find it.

5.9886   ⚬ᵒ   Round your answer to four decimal places as needed.

Score: 0.5/0.5 0.5/0.5
Time spent on this version: 2.8 minutes.
✉ Message instructor

Question 6.   Version 1*/1. Score: **1/1**

Consider the function `f (x) = 5x^3-6x` on the closed interval `[-4,-2]`.

Find the exact value of the slope of the secant line connecting `(-4,f(-4))` and `(-2,f(-2))`.

`m=`   134   ⚬ᵒ

By the Mean Value Theorem, there exists `c` in `(-4,-2)` so that `m=f'(c)`. Find all values of such `c` in `(-4,-2)`. Enter exact values. If there is more than one solution, separate them by a comma.

`c=`   −3.0550   ⚬ᵒ

Score: 0.5/0.5 0.5/0.5
Time spent on this version: 13.7 minutes.
✉ Message instructor

Question 7. | Version 1*/1. Score: **1/1** |

Given the function `g(x)=4x^3+18x^2-120x`, find the first derivative, `g'(x)`.

`g'(x)=` $12x^2 + 36x - 120$ ⚷

Notice that `g'(x)=0` when `x=2`, that is, `g'(2)=0`.

Now, we want to know whether there is a local minimum or local maximum at `x=2`, so we will use the second derivative test.
Find the second derivative, `g"(x)`.

`g"(x)=` $24x + 36$ ⚷

Evaluate `g"(2)`.

`g"(2)=` 84 ⚷

Based on the sign of this number, does this mean the graph of `g(x)` is <u>concave up</u> or <u>concave down</u> at `x=2`?

At `x=2` the graph of `g(x)` is | Concave Up ∨ | ✓ ⚷

Based on the concavity of `g(x)` at `x=2`, does this mean that there is a <u>local minimum</u> or <u>local maximum</u> at `x=2`?

At `x=2` there is a local | Minimum ∨ | ✓ ⚷

Score: 0.2/0.2 0.2/0.2 0.2/0.2 0.2/0.2 0.2/0.2
Time spent on this version: 4 minutes

T̶i̶m̶e̶ ̶s̶p̶e̶n̶t̶ ̶o̶n̶ ̶t̶h̶i̶s̶ ̶v̶e̶r̶s̶i̶o̶n̶.̶ ̶4̶ ̶m̶i̶n̶u̶t̶e̶s̶.̶

✉ Message instructor

Question 8.   Version 2*/2. Score: **1/1** ▾

Consider the function ` f(x) = 7 x + 8 x ^ ( -1 ) `. For this function there are four important intervals:

` (-\infty, A] `, ` [A,B) `, ` (B,C] `, and ` [C,\infty) `

where ` A `, and ` C ` are critical numbers and the function is not defined at ` B `.

Answer the following questions and round your answers to four decimals as needed.

Find ` A ` -1.069 ⚥

Find ` B `   0   ⚥

Find ` C `   1.069   ⚥

For each of the following intervals, tell whether ` f(x) ` is increasing or decreasing.

` (-\infty, A] `: Increasing ✔ ⚥

` [A,B) `: Decreasing ✔ ⚥

` (B,C] `: Decreasing ✔ ⚥

` [C,\infty) ` Increasing ✔ ⚥

Score: 0.143/0.143 0.143/0.143 0.143/0.143 0.143/0.143 0.143/0.143 0.143/0.143 0.143/0.143
Time spent on this version: 1.1 minutes.
✉ Message instructor

Question 9.   Version 2*/2. Score: **1/1** ▾

Consider the function ` f(x) = 8 (x - 5)^(2//3) `.

Find the critical number(s) 5 ⚷

Find the interval(s) where ` f(x) ` is increasing $(5,\infty)$ ⚷

Find the interval(s) where ` f(x) ` is decreasing $(-\infty,5)$ ⚷

Find the interval(s) where ` f(x) ` is concave down $(-\infty,5) \cup (5,\infty)$ ⚷

Score: 0.25/0.25 0.25/0.25 0.25/0.25 0.25/0.25
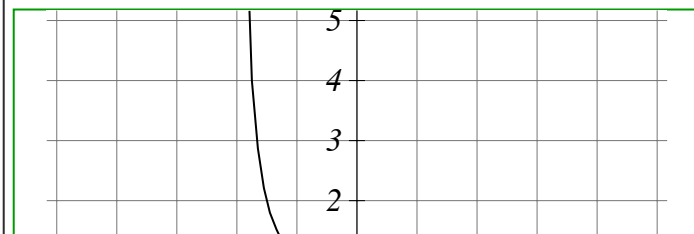Time spent on this version: 1.5 minutes.
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Question 10.   Version 1*/1. Score: **1/1**

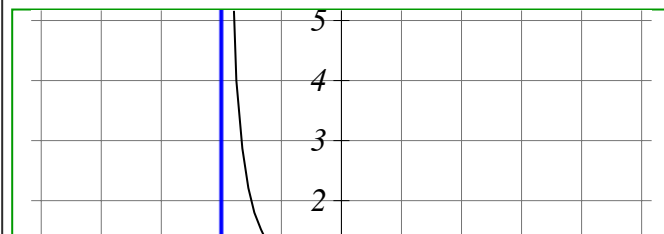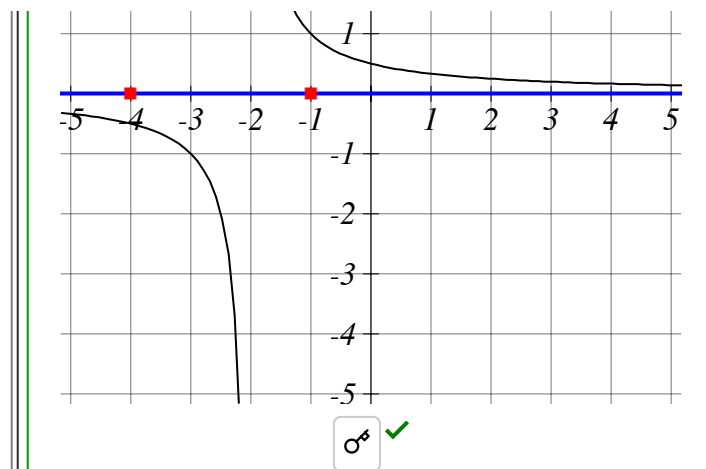| **Graphing Asymptotes for a Rational Functions**	
Two copies of the same rational function are shown below.	
On the graph below, draw the horizontal asymptote and write the equation for the horizontal asymptote underneath.	*On graph below, draw the the vertical asymptote and write the equation for the vertical asymptote underneath.*
` f(x) = (1)/(x + 2) `	` f(x) = (1)/(x + 2) `

Horizontal Asymptote:

$y = 0$

Vertical Asymptote:

$x = -2$
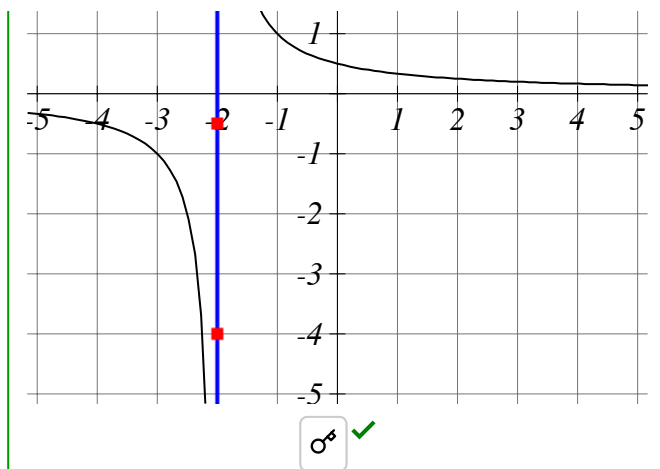
Score: 0.25/0.25 0.25/0.25 0.25/0.25 0.25/0.25
Time spent on this version: 1 minutes.
✉ Message instructor

Question 11. | Version 2*/2. Score: **1/1** ▾ |

The graph of `y = (-9 x +6)/(9 x +2)` has a horizontal asymptote with equation $y = -1$ ⚷

(enter the equation of the horizontal asymptote). Exact answers only.

Score: 1/1
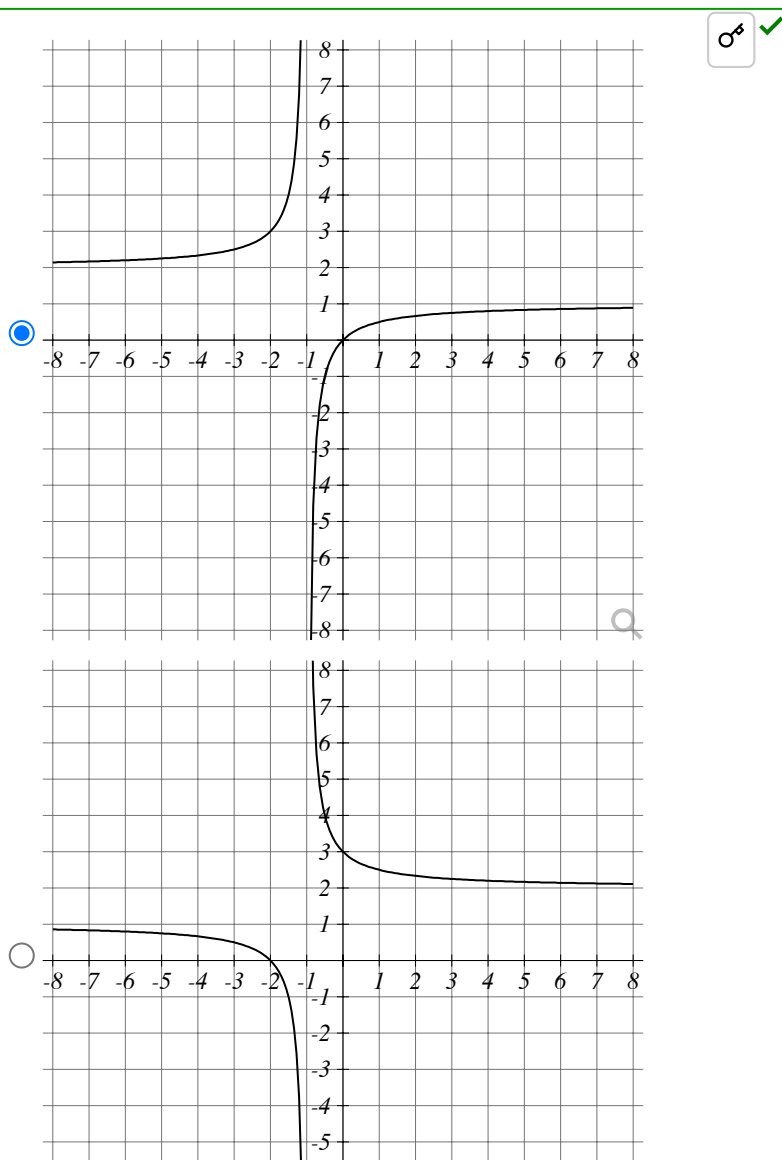Time spent on this version: 3.6 minutes.
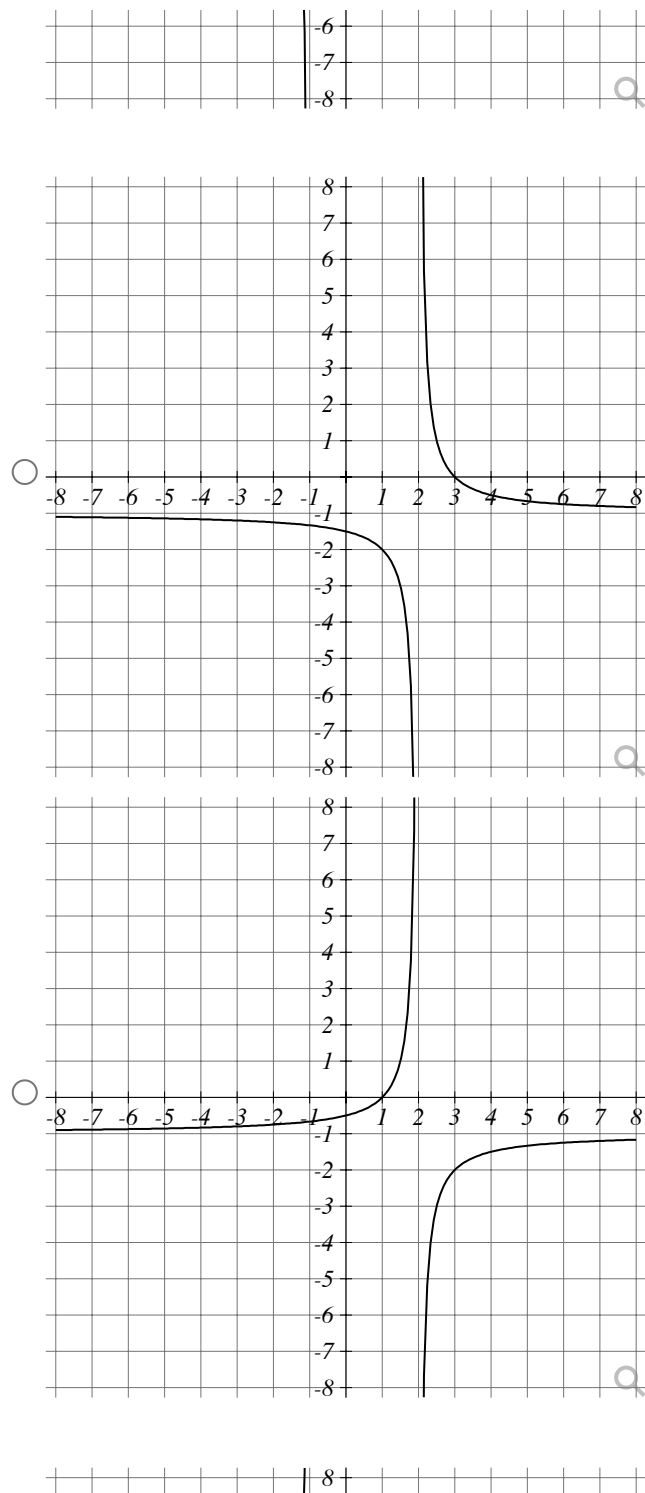✉ Message instructor

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Question 12. | Version 1*/1. Score: **1/1** |
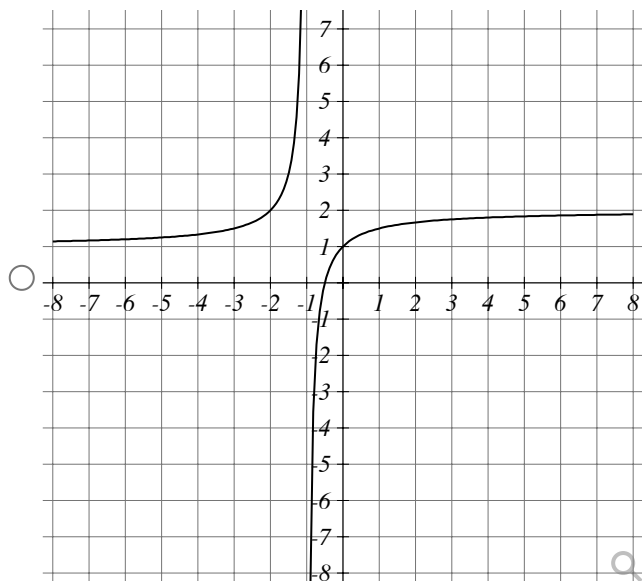
The graph of `y = f(x)` has the following features:

- `lim_(x to infty) f(x) = 1`
- `lim_(x to -infty) f(x) = 2`
- `lim_(x to -1^{-}) f(x) = infty`
- `lim_(x to -1^{+}) f(x) = -infty`

Which of the following might be a graph of `y = f(x)`?

○ None of these.

Score: 1/1
Time spent on this version: 0.7 minutes.
✉ Message instructor

Question 13.   Version 2*/2. Score: **1/1** ▼

Glorious Gadgets is a retailer of astronomy equipment. They purchase equipment from a supplier and then sell it to customers in their store. The function ` C(x) = 2x+12000x^(-1)+8000` models their total inventory costs (in dollars) as a function of `x` the lot size (the total number of pieces of astronomy equipment) for each of their orders from the supplier. The inventory costs include such things as purchasing, processing, shipping, and storing the equipment.

What lot size should Glorious Gadgets order to minimize their total inventory costs? [77] ⚲

What is their minimum total inventory cost? $ [8309.84] ⚲

Score: 0.5/0.5 0.5/0.5
Time spent on this version: 1.9 minutes.

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Question 14. | Version 1*/1. Score: **1/1** |

A company has a badly designed product, but a huge advertising budget. The product sells well when it is first introduced. However, sales fall as people switch to a better product from a competitor. Given that the monthly sales `S` can be modeled by

`S=(220 t)/(t + 2)^2`,   `t>=0`

where `S` is in thousands of dollars and `t` is in months. After how many months will sales be maximized and what will the maximum in sales be?

Sales will be maximized in | 2 | ⚲ months

The maximum sales will be $ | 27500 | ⚲

Score: 0.5/0.5 0.5/0.5
Time spent on this version: 14.2 minutes.
✉ Message instructor

Question 15. | Version 1*/1. Score: **1/1** |

A company that produces cell phones has a cost function of `C(x)=4x^2-12x+235`, where `C` is the cost in thousands of dollars and `x` is the number of cell phones produced (in thousands).

How many cell phones should be produced to minimize costs? | 1500 | ⚲ cell phones

What is the minimum cost? (Round to two decimals as needed) | 226000 | ⚲

Score: 0.5/0.5 0.5/0.5
Time spent on this version: 1.2 minutes.
✉ Message instructor

Feedback:

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