

MTH 150 Chapter 1

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1 Reflection

When doing the problems, I found that I was able to understand a lot of them, but others I didn't.

In section 1.1, I understood all of the problems and enjoyed working through them. However, there were sections that I had trouble with due to not learning it in the past. Therefore I had to look at the solution manual for the answers and work backwards.

I checked all my calculations with the solution manual and also *Mathway*. I found it very helpful to look at the solution manual and then work backwards to try and see how the answer was found. *Mathway* helped me recheck my work to make sure I didn't make any errors when solving the problems.

The thing that I struggled with and need to work on more is the graphing problems. In section 1.2 on page 35, I had a hard time trying to figure out how to graph the piece wise functions. I still don't understand when the point on the graph should be an open circle or a closed one, and how both equations coincide with each other on the graph. Another troublesome section for me was section 1.3 on page 50. With these graphing problems I really wasn't sure where to even start. I looked at the solution manual and then at the videos given to us for each section.

This was probably the most struggled part of chapter 1 for me that I still need to work through and review. The solution manual definitely helped me through all the problems in this chapter. I will be using it again most likely for the next chapter as well.

2 Section 1.1: Functions and Function Notation

2.1 Page 17 Numbers 21 and 23

For each of the following functions, evaluate: $f(-2)$, $f(-1)$, $f(0)$, $f(1)$, and $f(2)$

21.) $f(x) = 4 - 2x$ **Answers:**

$$f(-2) = 4 - 2(-2)$$

$$f(-2) = 4 + 4$$

$$f(-2) = 8$$

$$f(-1) = 4 - 2(-1)$$

$$f(-1) = 4 + 2$$

$$f(-1) = 6$$

$$f(0) = 4 - 2(0)$$

$$f(0) = 4 - 0$$

$$f(0) = 4$$

$$f(1) = 4 - 2(1)$$

$$f(1) = 4 - 2$$

$$f(1) = 2$$

$$f(2) = 4 - 2(2)$$

$$f(2) = 4 - 4$$

$$f(2) = 0$$

23.) $f(x) = 8x^2 - 7x + 3$ **Answers:**

$$f(-2) = 8(-2)^2 - 7(-2) + 3$$

$$f(-2) = 8(4) + 14 + 3$$

$$f(-2) = 32 + 14 + 3$$
$$f(-2) = 49$$

$$f(-1) = 8(-1)^2 - 7(-1) + 3$$
$$f(-1) = 8(1) + 7 + 3$$
$$f(-1) = 8 + 7 + 3$$
$$f(-1) = 18$$

$$f(0) = 8(0)^2 - 7(0) + 3$$
$$f(0) = 8(0) + 0 + 3$$
$$f(0) = 0 + 0 + 3$$
$$f(0) = 3$$

$$f(1) = 8(1)^2 - 7(1) + 3$$
$$f(1) = 8(1) - 7 + 3$$
$$f(1) = 8 - 7 + 3$$
$$f(1) = 4$$

$$f(2) = 8(2)^2 - 7(2) + 3$$
$$f(2) = 8(4) - 14 + 3$$
$$f(2) = 32 - 14 + 3$$
$$f(2) = 21$$

Comments

These exercises were fairly easy for me. It was a refresher from the last time I learned it. It was helpful for it to be the first set of problems to ease myself into this project.

I checked these problems using the solution manual from the textbook.

2.2 Page 18 Number 35

35.) Suppose $f(x) = x^2 + 8x - 4$. Compute the following:

a. $f(-1) + f(1)$

b. $f(-1) - f(1)$

Answers:

$$f(-1) = (-1)^2 + 8(-1) - 4$$

$$f(-1) = 1 - 8 - 4$$

$$f(-1) = -11$$

$$f(1) = (1)^2 + 8(1) - 4$$

$$f(1) = 1 + 8 - 4$$

$$f(1) = 5$$

a. $f(-1) + f(1)$

$$-11 + 5 = -6$$

b. $f(-1) - f(1)$

$$-11 - 5 = -16$$

Comments

This exercise was easy too, however I didn't quite understand it at first. I had to look at the solution manual and try to make sense of it. After doing that, I do now understand where the outcomes came from.

I checked these problems using the solution manual from the textbook.

2.3 Page 19 Number 43

43.) Write the equation of the circle centered at $(3, -9)$ with radius 6.

Answers:

$$(x - 3)^2 + (y + 9)^2 = (6)^2 = 36$$

Comments

I'm honestly not completely sure how to do this problem. I tried to look at the solution manual for help but my answer above is what I got. I still need help in understanding this problem.

I checked these problems using the solution manual from the textbook.

3 Section 1.2: Domain and Range

3.1 Page 34 Number 11

Find the domain of each function

11.) $f(x) = \frac{9}{x-6}$

Answers:

Because the equation has " x " in the denominator with 6, " x " can't be 6. Therefore, the domain is all real numbers excluding 6. The range equals all real numbers.

Comments

I'm not very comfortable with domain and range because I don't understand it very well. So, doing this problem was a little bit of a struggle. I looked to the solution manual to see if it would help me and it did a bit but it is still confusing to me.

I checked these problems using the solution manual from the textbook.

3.2 Page 34 Number 19

Given each function, evaluate: $f(-1), f(0), f(2), f(4)$

$$19.) f(x) = \begin{cases} 7x+3 & x < 0 \\ 7x+6 & x \geq 0 \end{cases}$$

Answers:

$$f(-1) = 7(-1) + 3$$

$$f(-1) = -7 + 3$$

$$f(-1) = -4 < 0$$

$$f(-1) = 7(-1) + 6$$

$$f(-1) = -7 + 6$$

$$f(-1) = -1 \geq 0$$

$$f(0) = 7(0) + 3$$

$$f(0) = 0 + 3$$

$$f(0) = 7(2) + 3$$

$$f(0) = 7(0) + 6$$

$$f(0) = 0 + 6$$

$$f(0) = 6 \geq 0$$

$$f(2) = 7(2) + 3$$

$$f(2) = 14 + 3$$

$$f(2) = 17 < 0$$

$$f(2) = 7(2) + 6$$

$$f(2) = 14 + 6$$

$$f(2) = 20 \geq 0$$

$$f(4) = 7(4) + 3$$

$$f(4) = 28 + 3$$

$$f(4) = 31 < 0$$

$$f(4) = 7(4) + 6$$

$$f(4) = 28 + 6$$
$$f(4) = 34 \geq 0$$

Comments

This section I found very easy and not too challenging. This section along with the first two problems in section 1.1 were easy for me to solve. I had no issue with this problem.

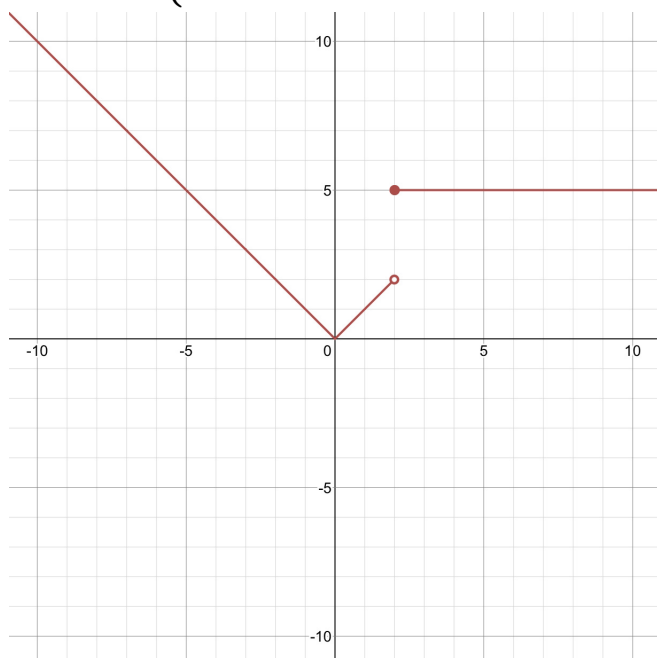
I checked these problems using the solution manual from the textbook.

3.3 Page 35 Numbers 31 and 33

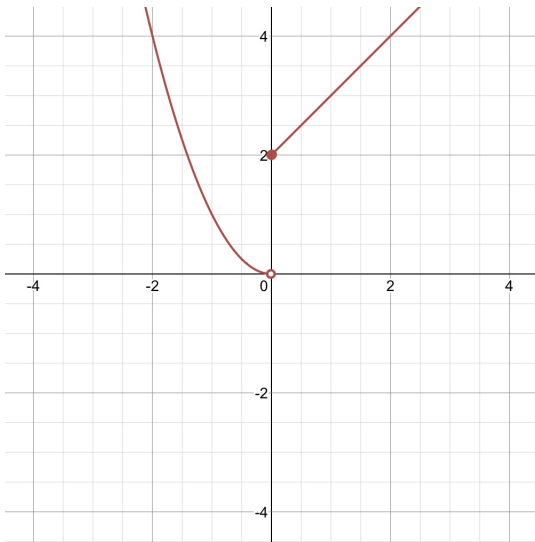
Sketch a graph of each piece wise function

Answers:

$$31.) f(x) = \begin{cases} |x| & \text{if } x < 2 \\ 5 & \text{if } x \geq 2 \end{cases}$$



$$33.) f(x) = \begin{cases} x^2 & \text{if } x < 0 \\ x+2 & \text{if } x \geq 0 \end{cases}$$



Comments

I'm not completely sure how to graph these equations myself. I got the solution by putting the equation into *Mathway* and then I uploaded the image of the graph here. I don't understand how you would graph the second equation on number 33. I wouldn't know where to start with the $x + 2$.

I checked these problems using the solution manual from the textbook.

4 Section 1.3: Rates of Change Behavior of Graphs

4.1 Page 48 Numbers 5 and 7

Find the average rate of change of each function on the interval specified.

Answers:

$$5.) f(x) = x^2 \text{ on } [1,5]$$

$$f(1) = (1)^2$$

$$f(1) = 1$$

$$f(5) = (5)^2$$

$$f(5) = 25$$

$$x=(1,1)$$

$$y=(5,25)$$

$$\frac{25-1}{5-1} = \frac{24}{4} = 6$$

$$7.) g(x) = 3x^3 - 1 \text{ on } [-3,3]$$

$$g(-3) = 3(-3)^3 - 1$$

$$g(-3) = 3(-27) - 1$$

$$g(-3) = -81 - 1$$

$$g(-3) = -82$$

$$g(3) = 3(3)^3 - 1$$

$$g(3) = 3(27) - 1$$

$$g(3) = 81 - 1$$

$$g(3) = 80$$

$$x=(-3, -82)$$

$$y=(3, 80)$$

$$\frac{80+82}{3+3} = \frac{162}{6} = 27$$

Comments

I understood how to find the solutions for these problems; I find them quite easy. I used the change in y over the change in x method and I felt very comfortable solving these. I had no problems with finding the correct solutions.

I checked these problems using the solution manual from the textbook.

4.2 Page 48 Number 11

Find the average rate of change of each function on the interval specified. Your answers will be expressions involving a parameter (b or h).

Answers:

$$11.) f(x) = 4x^2 - 7 \text{ on } [1, b]$$

$$f(1) = 4(1)^2 - 7$$

$$f(1) = 4(1) - 7$$

$$f(1) = 4 - 7$$

$$f(1) = -3$$

$$f(b) = 4(b)^2 - 7$$

$$x = (1, -3)$$

$$y = (b, 4b^2 - 7)$$

$$\frac{(4b^2-7)+3}{b-1} = \frac{4b^2-7+3}{b-1} = \frac{4b^2-4}{b-1} = \frac{4(b^2-1)}{b-1} = \frac{4(b+1)(b-1)}{(b-1)} = 4(b+1)$$

Comments

I wasn't completely sure how to solve this problem, so I went to the solution manual and looked up the answer to try and back track where it came from. It helped me a lot with getting to understand the problem by doing this. I now understand where to start with similar problems.

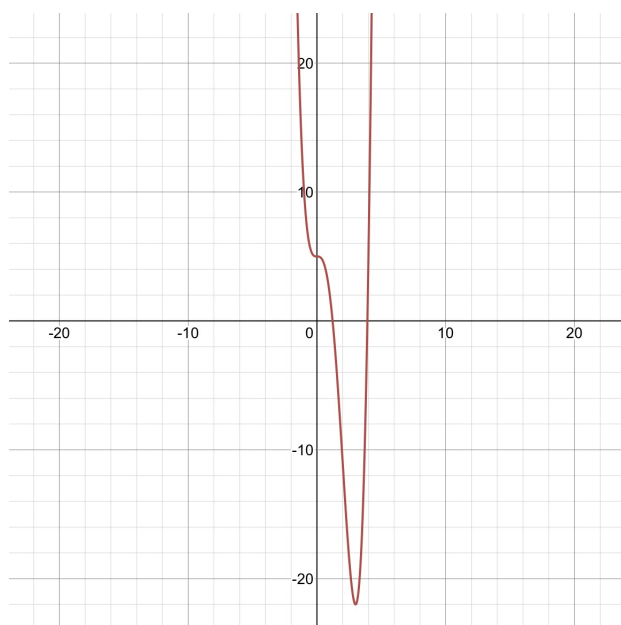
I checked these problems using the solution manual from the textbook.

4.3 Page 50 Number 37

Use a graph to estimate the local extrema and inflection points of each function, and to estimate the intervals on which the function is increasing, decreasing, concave up, and concave down.

Answers:

37.) $f(x) = x^4 - 4x^3 + 5$



Comments

I honestly was not sure and still am not sure where to start or go with this problem. I'm not sure how to graph this equation all I would know where to start is that 5 is the y-intercept. I got the graph for this problem using *Mathway* and then uploaded the image to here. I know that I do need more practice in the future with problems like this one.

I checked these problems using the solution manual from the textbook.

5 Section 1.4: Composition of Functions

5.1 Page 60 Number 1

Given each pair of functions, calculate $f(g(0))$ and $g(f(0))$.

Answers:

1.) $f(x) = 4x + 8$, $g(x) = 7 - x^2$

$$f(g(0)) = 4(7 - (0)^2) + 8$$

$$f(g(0)) = 4(7 - 0) + 8$$

$$f(g(0)) = 4(7) + 8$$

$$f(g(0)) = 28 + 8$$

$$f(g(0)) = 36$$

$$g(f(0)) = 7 - (4(0) + 8)^2$$

$$g(f(0)) = 7 - (0 + 8)^2$$

$$g(f(0)) = 7 - (8)^2$$

$$g(f(0)) = 7 - 64$$

$$g(f(0)) = -57$$

Comments

This problem was easy for me to solve due to my prior knowledge with problems like these. However, the solution for $f(g(0))$ I got was 36 and I checked my answer using *Mathway*, but on the solution manual the answer said 26 instead of 36. So, I wasn't sure if that was a typo on the solution manual or if I did do something wrong with my solving.

I checked these problems using the solution manual from the textbook.

5.2 Page 60 Numbers 21 and 23

For each pair of functions, find $f(g(x))$ and $g(f(x))$. Simplify your answers.

Answers:

$$21.) f(x) = \frac{1}{x-6}, g(x) = \frac{7}{x} + 6$$

$$f(g(x)) = \frac{1}{(\frac{7}{x}+6)-6} = \frac{x}{7}$$

$$g(f(x)) = \frac{7}{(\frac{1}{x-6})} + 6 = 7x - 36$$

$$23.) f(x) = x^2 + 1, g(x) = \sqrt{x+2}$$

$$f(g(x)) = (\sqrt{x+2})^2 + 1 = x + 3$$

$$g(f(x)) = \sqrt{(x^2 + 1) + 2} = \sqrt{x^2 + 3}$$

Comments

These problems were similar to the ones I solved in this section on page 60, number 1. I was very comfortable doing these problems. However, having to do the square roots of equations made it a bit more complicated, but I still got most of it.

I checked these problems using the solution manual from the textbook.

5.3 Page 61 Number 27

27.) If $f(x) = x^4 + 6$, $g(x) = x - 6$ and $h(x) = \sqrt{x}$, find $f(g(h(x)))$

Answers:

$$f(g(h(x))) = ((\sqrt{x}) - 6)^4 + 6$$

Comments

This problem was also very easy for me to solve since all I had to do was plug in each of the equations into the other. This was very simple to do and I had no problem accomplishing it.

I checked these problems using the solution manual from the textbook.

6 Section 1.5: Transformation of Functions

6.1 Page 85 Number 11

11.) Write a formula for $f(x) = \sqrt{x}$ shifted up 1 unit and left 2 units.

Answers:

$$f(x) = \sqrt{x+2} + 1$$

Comments

I wasn't sure where to start with finding the solution for this problem, but I looked at the solution manual for help to guide me. When looking there I saw the answer and found it very helpful. I then understood more about how to find the answer to similar problems.

I checked these problems using the solution manual from the textbook.

6.2 Page 87 Number 33

33.) Starting with the graph of $f(x) = 6^x$ write the equation of the graph that results from

- a. reflecting $f(x)$ about the x -axis and the y -axis
- b. reflecting $f(x)$ about the x -axis, shifting left 2 units, and down 3 units

Answers:

a. $f(x) = -6^{-x}$

b. $f(x) = -6^{x+2} - 3$

Comments

I went ahead and looked at the solution manual for help with this problem, but I'm still not completely sure how to find the answers for this. I understand part b more than I do part a. Part a makes no sense to me, and I don't know how I would apply this to other similar problems.

I checked these problems using the solution manual from the textbook.

6.3 Page 88 Number 39

39.) For each equation below, determine if the function Odd, Even, or Neither.

a. $f(x) = 3x^4$

b. $g(x) = \sqrt{x}$

c. $h(x) = \frac{1}{x} + 3x$

Answers:

a. Even

b. Neither

c. Odd

Comments

I'm not sure how to determine whether or not these functions are odd, even, or neither. I tried looking at the solution manual for help but I don't understand how they can be any of those three options. I still need to look over this problem and review it, as well as try similar ones.

I checked these problems using the solution manual from the textbook.

6.4 Page 89 Number 69

Determine the interval(s) on which the function is increasing and decreasing.

Answers:

69.) $a(x) = \sqrt{-x + 4}$

This function is decreasing on the interval $x \leq 4$

Comments

With this problem I understand where the 4 comes from for the answer, but I'm not sure how to know whether the lesser than or equal to sign is supposed to be the lesser than or equal to sign or if it's supposed to be the lesser than sign. I'm not sure how I would be able to tell the difference in the equation.

I checked these problems using the solution manual from the textbook.

7 Section 1.6: Inverse Functions

7.1 Page 100 Numbers 13, 15, 19 and 21

For each function below, find $f^{-1}(x)$

Answers:

13.) $f(x) = x + 3$

$$f^{-1}(x) = x - 3$$

15.) $f(x) = 2 - x$

$$f^{-1}(x) = 2 - x$$

Comments

I solved both of these problems using *Mathway* to check my work. I understand how problem number 13 is solved because the solution is the opposite. However, I'm not sure why the solution for problem number 15 is the same as the original equation. I believe I need more practice with problems similar to these.

I checked these problems using the solution manual from the textbook.

For each function, find a domain on which f is one-to-one and non-decreasing, then find the inverse of f restricted to that domain.

Answers:

19.) $f(x) = (x + 7)^2$

This function is non-decreasing on the interval $x > -7$. The inverse is $f^{-1}(x) = \sqrt{x} - 7$.

21.) $f(x) = x^2 - 5$

This function is non-decreasing on the interval $x > 0$. The inverse is $f^{-1}(x) = \sqrt{x + 5}$.

Comments

I'm not sure what intervals in graphs mean so these problems confused me. I looked at the solution manual for reference to help me try and back track the solution to how it was solved. But, doing so did not help me. I am still very confused and not entirely sure how these equations are solved.

I checked these problems using the solution manual from the textbook.