

MTH 150 Chapter 1

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1 Reflection

I found mostly sections 1.1 – 1.3 simple just because I have seen most of these problems in high school.

Especially section 1.1 the problems were basic functions and basic math. In section 1.6 the problems were also easy because I am well doing inverses.

I found the section 1.5 difficult as finding out if it's even or odd is still a concept I am not well-versed in. Also, 1.4 number 27 because the problem was so long that I am not sure if I did it correct. I used the book to find out all my answers and re read it to understand them thoroughly.

What I didn't understand was how to determine if it was even or odd because the definition to me is still confusing. The way and only way to learn in math is just to keep practicing so that's what I will be doing to further understand this concept.

2 Section 1.1: Functions and Function Notation

2.1 21,22,35,43

For each of the following functions, evaluate:

$$f(2), f(1), f(0), f(1), \text{ and } f(2)$$

21. $f(x) = 4 - 2(x)$

$$f(-2) = 4 - 2(-2) \text{ so } 4 + 4 = 8$$

$$f(-1) = 4 - 2(-1) \text{ so } 4 + 2 = 6$$

$$f(0) = 4 - 2(0) \text{ so } 4 - 0 = 4$$

$$f(2) = 4 - 2(2) \text{ so } 4 - 4 = 0$$

22 $f(x) = 8 - 3(x)$

$$f(-2) = 8 - 3(-2) \text{ so } 8 + 6 = 14$$

$$f(-1) = 8 - 3(-1) \text{ so } 8 + 3 = 11$$

$$F(0) = 8 - 3(0) \text{ so } 8 + 0 = 8$$

$$f(2) = 8 - 3(2) \text{ so } 8 - 6 = 12$$

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

$$f(1) + f(1)$$

$$f(1)f(1)$$

35A

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

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

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

$$-1 - 8 - 4 = -13$$

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

$$1 + 8 - 4$$

$$1 + 4 = 5$$

$$-13 + 5 = -8$$

35B

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

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

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

$$-1 - 8 - 4 = -13$$

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

$$1 + 8 - 4$$

$$1 + 4 = 5$$

$$-13 - 5 = -18$$

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

$$(x - a)^2 + (y - b)^2 = r^2$$

$$(a, b) = (3, -9)r = 6$$

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

Comments

This was pretty simple, i just had to watch out for the sign with $f(-1)$ to make sure i got the right output

3 Section 1.2: Domain and Range

7,19,31,32

7 Find the domain of each function

$$f(x) = 3\sqrt{x - 2}$$

Domain : $x - 2 \geq 0$
 $x \geq 2$

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

$7x + 3$ if $x < 0$

$7x + 6$ if $x \geq 0$

$7x + 3$ (-1)

$$7(-1) + 3$$

$$-7 + 3 =$$

$$x = -4$$

$7(x) + 6$ (0,2,4)

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

$$x = 6$$

$$7(2) + 6 = 14 + 6$$

$$x = 20$$

$$7(4) + 6 = 28 + 6$$

$$x = 34$$

31 This as well felt pretty simple for me as this is something i came across in high school

4 Section 1.3: Rates of Change Behavior and of Graphs

5,6,11,37

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

$$\frac{f(x) - f(y)}{x - y}$$

5

$$f(x) = x^2, 1, 5$$

$$\frac{1^2 - 5^2}{1 - 5}$$

$$\frac{1 - 25}{-4}$$

$$\frac{-24}{-4} = 6$$

6

$$g(x) = x^3 - 4, -2$$

$$\frac{-4^3 - 2^3}{-4 - 2}$$

$$\frac{-64 - 8}{-6}$$

$$\frac{-72}{-6}$$

$$= 12$$

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).

$$\begin{aligned}
 f(x) &= (4x^2 - 7), b \\
 \frac{4(1)^2 - 7 - (4(b)^2 - 7)}{1 - b} \\
 &= \frac{4 - 7 - 4b^2 - 7}{1 - b} \\
 &= \frac{-3 - 4b^2 - 7}{1 - b} \\
 &= \frac{-10 - 4b^2}{1 - b} \\
 &= \frac{-4b - 10}{1 - b} + 4b \\
 &= 4b + 4 - \frac{14}{-b + 1}
 \end{aligned}$$

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.

Local Minima	$(0, 5)(3, -22)$
local maxima	<i>None</i>
Inflection Points	$(-1, 10)(2, -13)$
Increasing	$(3, \infty)$
Decreasing	$(-\infty, 5)$
decreasing from	$(0, 5)(3, 22)$

5 Section 1.4: Composition of Functions

1,21,22,27

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

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

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

$$4(7) + 8$$

$$28 + 8 = 36$$

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

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

$$7 - 64 = -54$$

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

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

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

$$\frac{1}{\frac{7}{x} + 6}$$

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

$$\frac{7(x-6)}{1}$$

$$7(x-6) + 6 = 7(x) - 42 + 6$$

$$7x - 36$$

22

$$f(x) = \frac{1}{x-4}g(x) = \frac{2}{x} + 4$$

$$f(g(x)) = \frac{1}{\frac{2}{x}} + 4 - 4$$

$$\frac{1}{\frac{2}{x}}$$

$$\frac{x}{2}$$

$$g(f(x)) = \frac{2}{\frac{1}{x-4}} + 4$$

$$\frac{2(x-4)}{1} = 2x - 4 = 2x - 8 + 4$$

$$2x - 4$$

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

$$f(g(x)) = (x - 6)^4 + 6$$

$$(x - 6)(x - 6)(x - 6)(x - 6)$$

$$x^2 - 6x - 6x + 36$$

$$x^2 - 12x + 36(x^2 - 12x + 36)$$

$$x^4 - 12x^3 + 36x^2 - 12x^3 + 24x^2 - 432x + 36x^2 - 432x + 1296$$

$$x^4 - 24x^3 + 216x^2 - 864x + 1296 +$$

$$\sqrt{x^4} - \sqrt{24x^3} + \sqrt{216x^2} - \sqrt{216x^2} - \sqrt{864x} + 1302$$

$$x^2 - 2\sqrt{6}x\sqrt{x}$$

$$6\sqrt{6}x - 12\sqrt{6}\sqrt{x} + 1302$$

6 Section 1.5: Transformation of Functions

11,33,39,67

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

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

33 Starting with the graph of $f(x) = 6^x$ write the equation of the graph that results in A. reflecting $f(x)$ about the x,y axis. B. Reflecting $f(x)$ about the x axis shifting left 2 units, and down 3 units

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

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

39A

$$f(x) = 3(x)^4$$
$$3(-x)^4 = 3(x)^4$$
$$f(-x) = f(x)$$

Even

39B

$$g(x) = \sqrt{x}$$
$$-\sqrt{x} = -\sqrt{x}$$

Odd

39C

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

Odd

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

$$f(x) = 4(x + 1)^2 - 5$$

Decreasing $(-\infty, -5)$ *Increasing* $(\infty, -5)$

Comments

I'm still unsure about numbers 39 and 67, i looked up the video lessons to get a refresher on the exercise but still having a little trouble as too what steps i should take to solve the problem.

7 Section 1.6: Inverse Functions

13-17 For each function below, find $f^{-1}(x)$

13

$$\begin{aligned}f(x) &= x + 3 \\y &= x + 3 \\x - 3 &= y + 3 - 3 \\y &= x - 3\end{aligned}$$

14

$$\begin{aligned}f(x) &= x + 5 \\y &= x + 5 \\x - 5 &= y + 5 - 5 \\y &= x - 5\end{aligned}$$

15

$$\begin{aligned}f(x) &= 2 - x \\y &= 2 - x \\x &= 2 - y \\-y &= x - 2 \\y &= 2 - x\end{aligned}$$

16

$$\begin{aligned}f(x) &= 3 - x \\y &= 3 - x \\x &= 3 - y \\y + x - x &= 3 - x \\y &= 3 - x\end{aligned}$$

17

$$f(x) = 11 + 7$$

$$y = 11 + 7$$

$$x - 7 = 11y + 7 - 7$$

$$x - 7 = (11y)/11$$

$$y = \frac{x - 7}{11}$$

Comments

This was fairly simple, I'm still having trouble getting used to latex and its commands