V. 1

CHAPTER 1 TEST

No calculators, no cell phones, organic brain activity only.

Math 231
September 19, 2008

Name: * key *

By printing my name I pledge to uphold the honor code.

1. Fill in the blanks with points in coordinate notation, given that the the point $(2, 3)$ is on the graph of $f(x)$.

1.6 #4
1.7 #9

(2,5) is on the graph of $f(x) + 2$

(2,9) is on the graph of $3f(x)$

(0,3) is on the graph of $f(x + 2)$

$(\frac{2}{3}, 3)$ is on the graph of $f(3x)$

(3,2) is on the graph of $f^{-1}(x)$

(-2,3) is also on the graph if f is even

2. Complete each of the following definitions. 1.4, 1.6, 1.7

A function f is *one-to-one* if: for all $a, b \in \text{dom}(f)$, $a \neq b \Rightarrow f(a) \neq f(b)$

A function f is a *power function* if: can write $f(x) = Ax^k$ for some $A \in \mathbb{R}$, k rat'l

A function f is an *odd function* if: $f(-x) = -f(x)$ for all $x \in \text{dom}(f)$

3. Assuming that f is a linear function, deduce the missing values in the table. 1.3 #10

over 2, +1, +3, +2

x	1	3	4	7	9
$f(x)$	1	−5	−8	−17	−23

down 6, −3, −9, −6

$$y - 1 = \left(\frac{-5-1}{3-1}\right)(x-1) \quad (-3)$$

$$y = -3x + 4$$

can check w/this's

4. Use the values given in the table to deduce the missing values.

1.5 #38, 39

x	$f(x)$	$g(x)$	$(f - g)(x)$	$(f \circ g)(x)$
1	1	2	−1	3
2	3	1	2	1
3	2	3	−1	2

$f(g(1)) = f(2) = 3$

$f(g(2)) = f(1) = 1$

$f(g(3)) = f(3)$ (= 2)

V. 1

5. What types of functions are these? Circle ALL that apply for each function. Circle NONE if none of the options apply. 1.4 #6,12

$f(x) = 3^x$ algebraic / linear / polynomial / power / rational / (NONE)

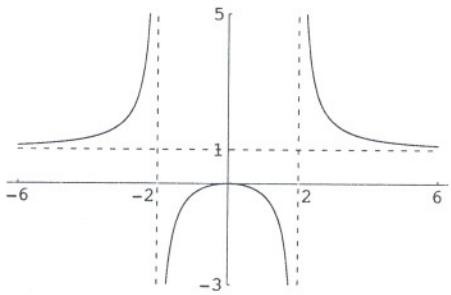
$g(x) = 42\pi^3 - x$ (algebraic) / (linear) / (polynomial) / power / (rational) / NONE

$h(x) = \dfrac{x^2 - 1}{\sqrt{x} + 1}$ algebraic / linear / polynomial / power / rational / (NONE)

$k(x) = 3x^5 + 2x^{-1}$ (algebraic) / linear / polynomial / power / (rational) / NONE

↖ could rewrite as $\frac{P(x)}{q(x)}$

6. The graph of a function f is given below. List the appropriate information (write NONE if none exist). Be sure to use interval notation for the last three parts. 1.2 #7



domain of f: $(-\infty,-2) \cup (-2,2) \cup (2,\infty)$

local maximums occur at: $x = 0$

local minimums occur at: NONE

global maximums occur at: NONE

asymptotes of f: $y = 1$, $x = -2$, $x = 2$

f is positive here: $(-\infty,-2) \cup (2,\infty)$

f is negative here: $(-2,2)$

f is concave up here: $(-\infty,-2) \cup (2,\infty)$

7. Given the function $f(x) = \dfrac{\sqrt{x+1}}{4-x}$, find the following. 1.1 #25,33,35, 1.3 #22

$f(2) = \dfrac{\sqrt{2+1}}{4-2} = \dfrac{\sqrt{3}}{2}$

$f(x-1) = \dfrac{\sqrt{(x-1)+1}}{4-(x-1)} = \dfrac{\sqrt{x}}{5-x}$

$\begin{cases} x+1 \geq 0 \\ 4-x \neq 0 \end{cases} \Rightarrow \begin{matrix} x \geq -1 \\ x \neq 4 \end{matrix}$

Domain(f) = $[-1,4) \cup (4,\infty)$

(AROC of f on $[0,2]$) = $\dfrac{2\sqrt{3}-1}{8}$

$\dfrac{f(2)-f(0)}{2-0} = \dfrac{\sqrt{3}/2 - \sqrt{1}/4}{2} = \dfrac{2\sqrt{3}-1}{8}$