

# 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

(0, 3) is on the graph of  $f(x + 2)$       ( $\frac{2}{3}$ , 3) is on the graph of  $f(3x)$   
(2, 5) is on the graph of  $f(x) + 2$       (2, 9) is on the graph of  $3f(x)$   
(3, 2) is on the graph of  $f^{-1}(x)$       (-2, -3) is also on the graph if  $f$  is odd

2. Complete each of the following definitions.

1.4, 1.6, 1.7

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

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

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

1.3 #10

$x$	1	3	4	7	9
$f(x)$	0	-6	-9	-18	-24

*Handwritten notes:* up 2, +1, +3, +2 (between x values); down 6, -3, -9, -6 (between f(x) values)

$$y - 0 = \left(\frac{-6 - 0}{3 - 1}\right)(x - 1)$$

$$y = -3x + 3$$
 can check w/ this

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

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

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

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

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 / power / polynomial / rational / linear / **NONE**

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

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

$k(x) = 3x^5 + 2x^{-1}$  **algebraic** / power / polynomial / **rational** / linear / 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  $f$ :  $(-\infty, -2) \cup (-2, 2) \cup (2, \infty)$

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

local minimums occur at: **NONE**

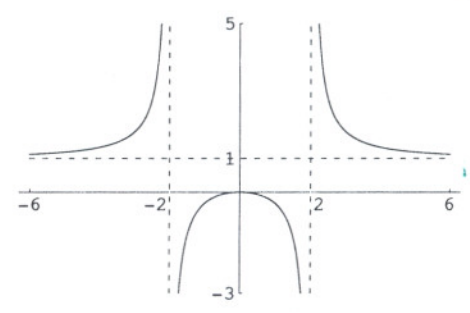
local maximums occur at:  $x=0$

global maximums occur at: **NONE**

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

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

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



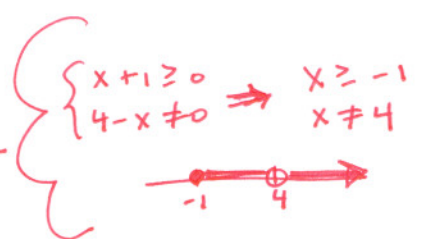
7. Given the function  $f(x) = \frac{\sqrt{x+1}}{4-x}$ , find the following.

1.1 #33, 35, 25, 1.3 #22

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

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

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



(AROC of  $f$  on  $[0, 3]$ ) =  $\frac{7}{12}$

$\frac{f(3) - f(0)}{3 - 0} = \frac{2 - \sqrt{1/4}}{3} = \frac{2 - 1/4}{3} = \frac{8 - 1}{12} = \frac{7}{12}$