

$$f(x) = \frac{x^3}{x^8+1} \quad f(1) = \frac{1}{2}, \quad f(-1) = -\frac{1}{2}$$

Math 108 Fall 2014 Quiz 3

Name

Key

Directions: Answer each question as completely as possible. Show all work for credit. Good luck!

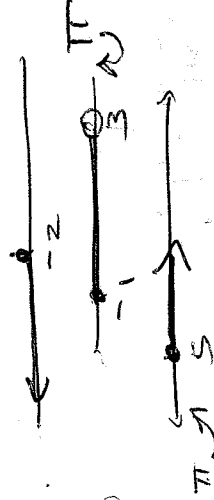
1. Find the domain for each function. Write your answers in interval notation.

a) $f(x) = \sqrt{x-7}$ $x-7 \geq 0, \quad x \geq 7 \quad [7, \infty)$

b) $g(x) = \frac{x+2}{3x^2+18x}$ $3x^2+18x \neq 0$ $x \neq 0, -6$
 $3x(x+6) \neq 0$ $(-\infty, -6) \cup (-6, 0) \cup (0, \infty)$

c) $h(x) = \begin{cases} 2x-7 & \text{if } x \geq 4 \\ -x^2 & \text{if } x < 4 \end{cases}$ $[4, \infty)$
 $(-\infty, 4)$

2. Suppose $f(x) = \begin{cases} 3x+2 & \text{if } x \leq -2 \\ 10 & \text{if } -1 \leq x < 3 \\ x^{-1} & \text{if } x \geq 5 \end{cases}$



Evaluate each of the following:

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

b) $f(0) = 10$

c) $f(\pi) = \text{not defined}$

d) $f(100) = \frac{1}{100} = 100^{-1}$

3. Is $f(x) = \frac{x^3}{x^8+1}$ an odd function, an even function, or neither? Justify your answer.

Def $f(-x) = \frac{(-x)^3}{(-x)^8+1} = \frac{-x^3}{x^8+1} = -\frac{x^3}{x^8+1} = -f(x)$ odd

Start by ~~examining~~ examining $f(-x)$

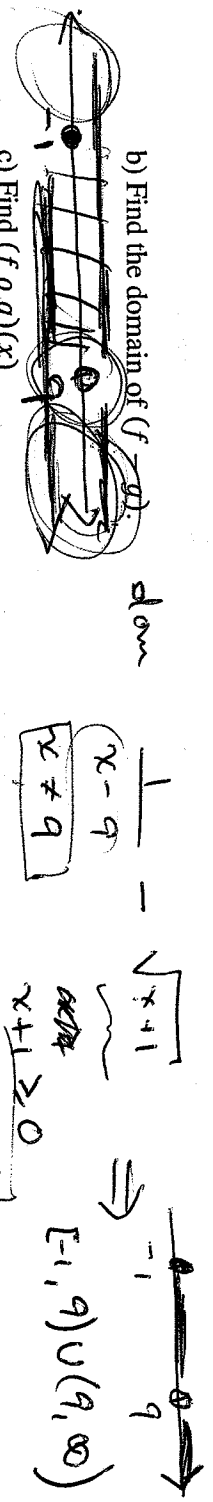
$$-f(x) = -\left(\frac{x^3}{x^8+1}\right) \quad -\frac{a}{b} = \frac{a}{-b} = -\frac{a}{b}$$

and apply the definition to your answer

$D_{f+g} = D_f \cap D_g$ elements in both dom $f+g$ are in $f+g$ dom

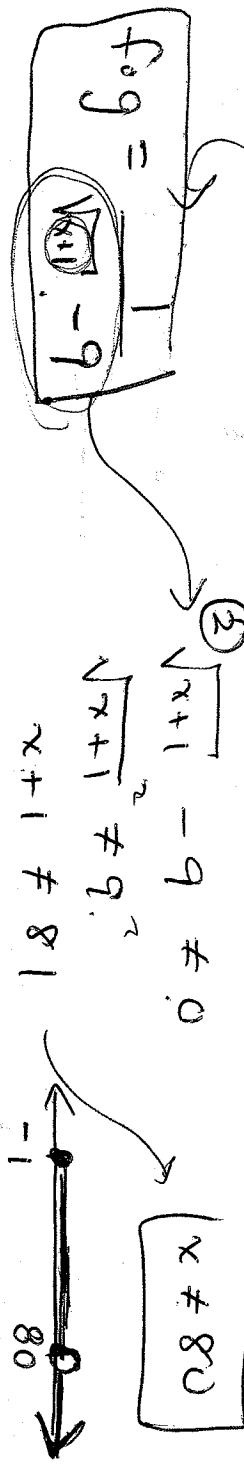
4. Suppose $f(x) = \frac{1}{x+9}$ and $g(x) = \sqrt{x+1}$
 $D_f = x \neq -9$ $D_g = x \geq -1$ $f+g = \frac{1}{x+9} + \sqrt{x+1}$

a) Find $(f+g)(8) = \frac{1}{8-9} + \sqrt{8+1} = -1+3 = 2$



b) Find the domain of $f \circ g$
 c) Find $(f \circ g)(x)$
 $f(\sqrt{x+1}) = \frac{1}{\sqrt{x+1}-9}$

d) Find the domain of $(f \circ g)$.
 ① $x+1 \geq 0, \sqrt{x+1} \neq -9$



$f \circ g = \frac{1}{\sqrt{x+1}-9}$
 $E = \{1, 80\} \cup (80, \infty)$
 constant. (Turn $ax^2 + bx + c$ into $a(x-h)^2 + k$.)

5. Use completing the square to rewrite $2x^2 + 10x - 7$ as the sum of a perfect square and a

$2(x^2 + 5x + \square) - 7$ factor out 2
 $= 2(x^2 + 5x + (\frac{5}{2})^2) - 7 = 2(x + \frac{5}{2})^2 - 7$
 $= 2(x + \frac{5}{2})^2 - \frac{7}{1} - \frac{25}{2}$
 $= 2(x + \frac{5}{2})^2 - \frac{39}{2}$