

WRITE YOUR NAME:

MAC 2241 Homework 2

Due in class, Friday January 27th

You can use more paper if necessary, but please STAPLE

Question 1. If  $f(x) = x^2$ , simplify the given expression.

$$\frac{f(3+h) - f(3)}{h}$$

$$\frac{(3+h)^2 - 3^2}{h} = \frac{(9+6h+h^2) - 9}{h}$$

$$= \frac{6h + h^2}{h} = \frac{h(6+h)}{h}$$

$$= 6 + h$$

Question 2. If  $f(x) = \frac{1}{x}$ , simplify the given expression.

$$\frac{f(5+h) - f(5)}{h}$$

$$\frac{\frac{1}{5+h} - \frac{1}{5}}{h} \cdot \frac{5(5+h)}{5(5+h)}$$

$$= \frac{\frac{5(5+h)}{5+h} - \frac{5(5+h)}{5}}{h \cdot 5(5+h)} = \frac{5 - (5+h)}{h \cdot 5(5+h)}$$

$$= \frac{5 - 5 - h}{h \cdot 5(5+h)} = \frac{-h}{h \cdot 5(5+h)}$$

$$= \frac{-1}{5(5+h)}$$

Question 3. Find the domain of the function.

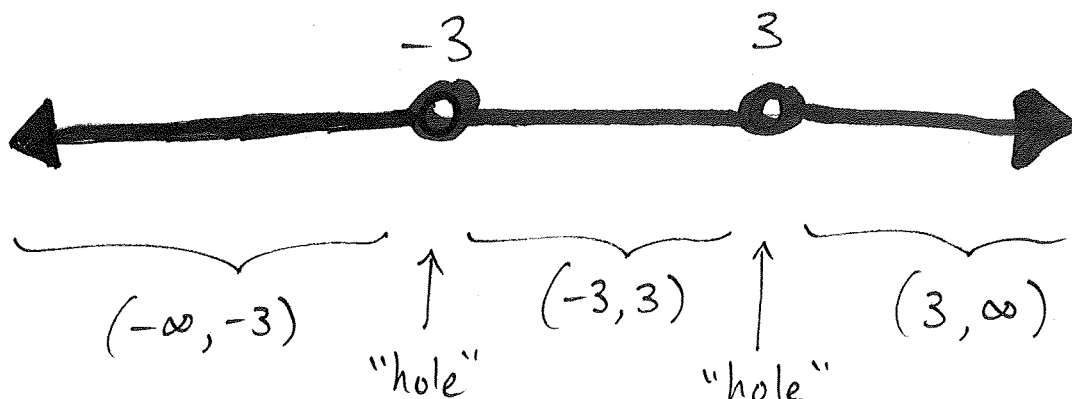
$$f(x) = \frac{x+4}{x^2-9}$$

Domain is all  $x$  except where function is undefined  
Function is undefined if denominator is zero.

$$x^2 - 9 = 0 \Rightarrow x = 3 \text{ or } -3$$

Domain is all numbers except 3 and -3.

Could also write in interval notation as  
 $(-\infty, -3) \cup (-3, 3) \cup (3, \infty)$



Question 4. Find the domain of the function.

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

Domain is all  $x$  for which the function is defined.

Since one step tries to take the square root of  $3-x$ ,

We must have  $3-x \geq 0$ .

Since one step tries to take the square root of  $2+x$ ,

We must have  $2+x \geq 0$ .

$$3-x \geq 0$$

$$2+x \geq 0$$

$$\Rightarrow 3 \geq x$$

$$\Rightarrow x \geq -2$$

$$\text{or } x \leq 3$$

We must have both  $x \geq -2$  and  $x \leq 3$ .

$$\text{or } -2 \leq x$$

Domain is  $-2 \leq x \leq 3$  or  $[-2, 3]$

Picture:

