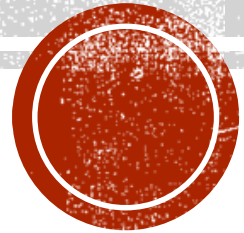
DOMAINS OF FUNCTIONS

Honors Calculus

Keeper 3



DOMAIN OF FUNCTIONS

Domain – the set of all possible x-values

- The denominator cannot be 0
- The number under a square (or even) root cannot be negative
- You can't take the log (or ln) of a negative number or 0

[or] if # is included in domain

(or) if # is not included or $\pm\infty$

FIND THE DOMAIN OF THE FUNCTIONS:

1. $f(x) = \sqrt{x-1}$ → can't be negative

$x - 1 \geq 0$

$x \geq 1$

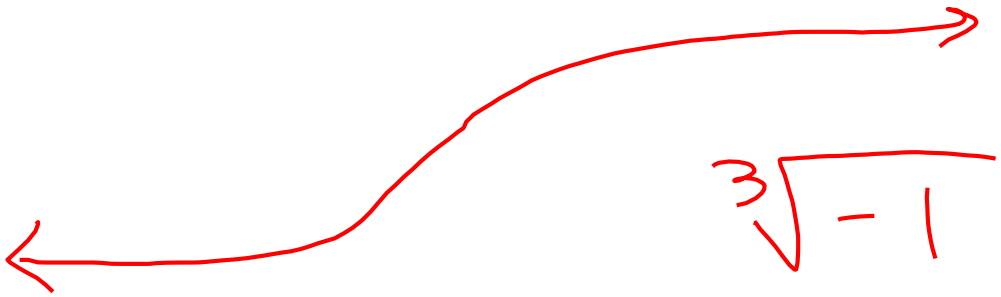
$[1, \infty)$

FIND THE DOMAIN AND RANGE OF THE FUNCTIONS:

2. $f(x) = \sqrt[3]{x+7}$

odd root is always $\mathbb{R}$

$(-\infty, \infty)$



$\sqrt[3]{-1} = -1$

$\sqrt[3]{0} = 0$

$\sqrt[3]{1} = 1$

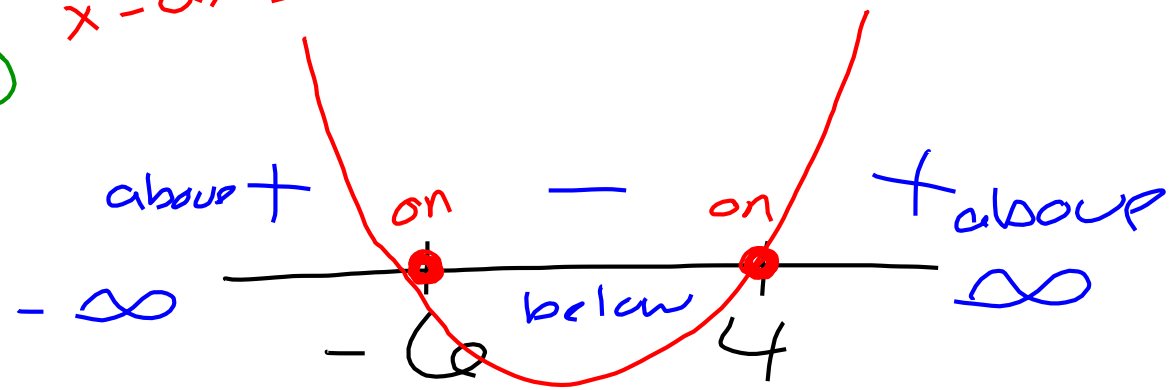
$$3.\ f(x) = \sqrt[4]{x^2 + 2x - 24}$$

even root so radicand must be positive or 0

$x^2 + 2x - 24 \geq 0$ (above x-axis)

$(x+6)(x-4) = 0$

x-int: $x = -6 \quad x = 4$



$(-\infty, -6] \cup [4, \infty)$

$$4.\ f(x) = \frac{x+4}{3x-7}$$

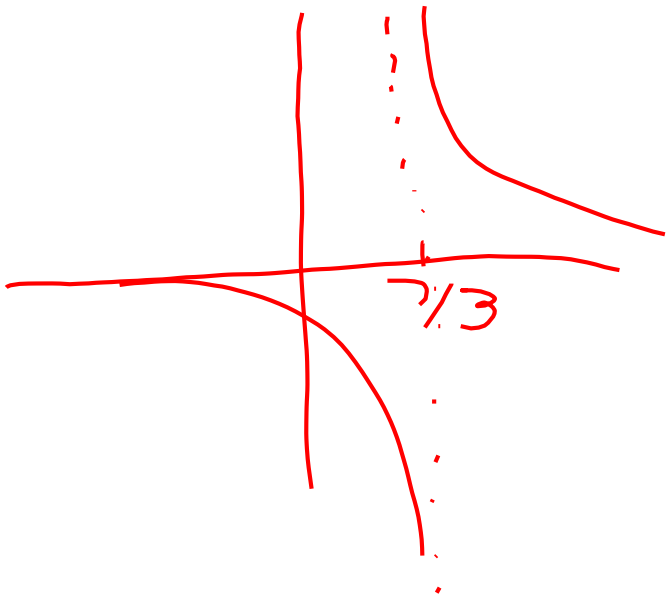
you can't divide by 0

$3x-7 \neq 0$

$3x \neq 7$

$x \neq \frac{7}{3}$

$(-\infty, 7/3) \cup (\frac{7}{3}, \infty)$



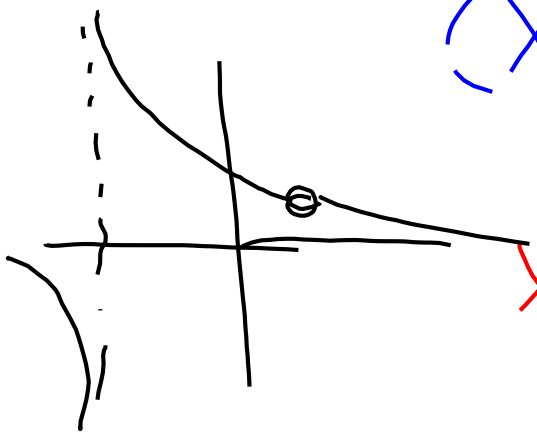
5. $f(x) = \dfrac{4x-8}{x^2+3x-10}$

Factor 1st!

$f(x) = \dfrac{4(x-2)}{(x+5)(x-2)}$ ← creates a hole at $x=2$

$x-2=0$

$x \neq 2$



$x+5 \neq 0$

$x \neq -5$

$(-\infty, -5) \cup (-5, 2) \cup (2, \infty)$

$$6.\ f(x) = \frac{1}{\sqrt{x-1}}$$

can't have a - # under $\sqrt{\ }$

denom. can't $= 0$

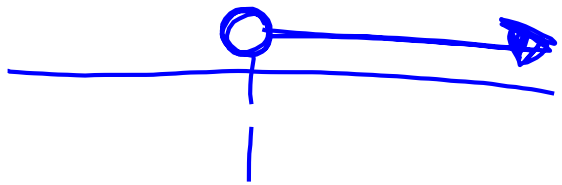
$x - 1 = 0$

$x \neq 1$

$\sqrt{x-1} \geq 0$

$x - 1 \geq 0$

$x \geq 1$



$(1, \infty)$

$$7.\ f(x) = \sqrt{\frac{2x+5}{x+8}}$$

① can't have − under √

② can't have 0 in denom

② $x+8 \neq 0$

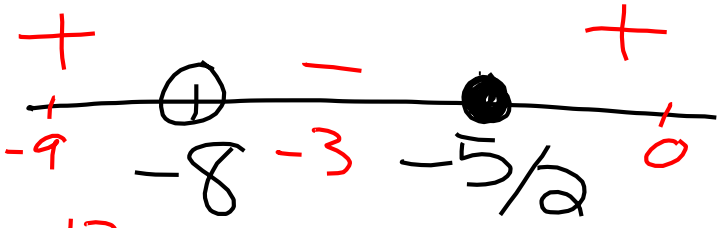
$x \neq -8$

① $\frac{2x+5}{x+8} \geq 0$ positive

Solve to find x-int $\frac{2x+5}{x+8} = 0$

$0 = 2x+5$

x-int: $x = -5/2$



$\frac{-13}{-1} = 13$

$(-\infty, -8) \cup [-5/2, \infty)$

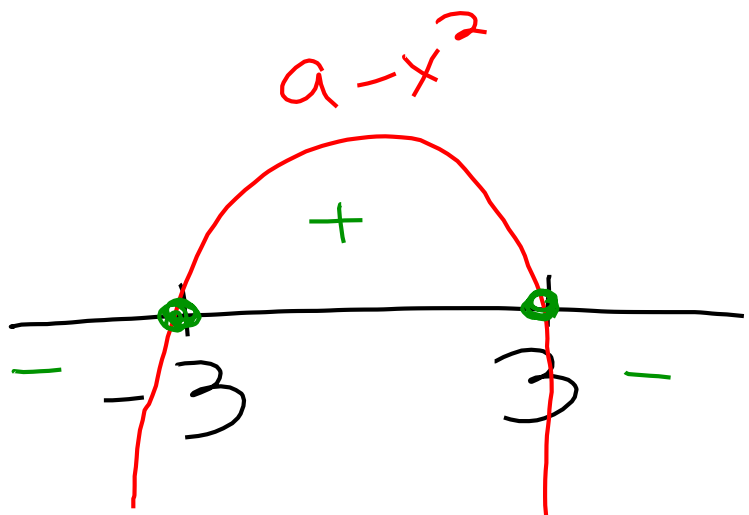
8. $f(x) = \sqrt{9 - x^2}$

can't be $\sqrt{-\#}$

$9 - x^2 \geq 0$

$(3+x)(3-x) \geq 0$

X-int: $x = -3$ $x = 3$



$[-3, 3]$

9. $f(x) = \ln(x^2 - 4x + 3)$

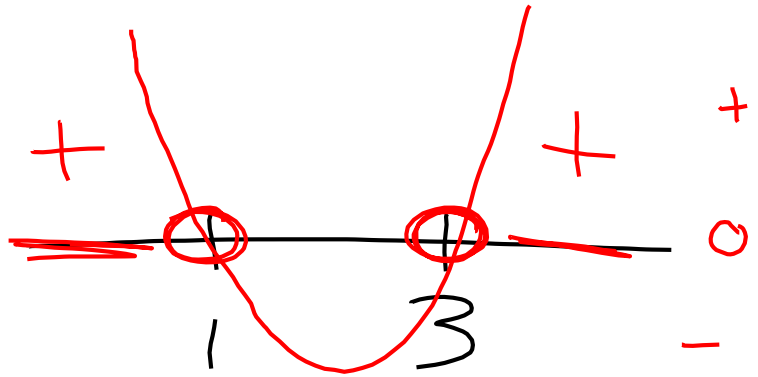
can't take a log of 0 or -#

$x^2 - 4x + 3 > 0$

$(x-3)(x-1)$

x-int: $x = 3$ $x = 1$

+ or above x-axis

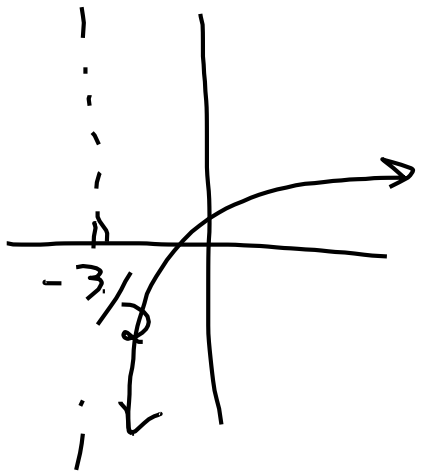


$(-\infty, 1) \cup (3, \infty)$

10. $f(x) = \log_5(2x + 3) - 4$

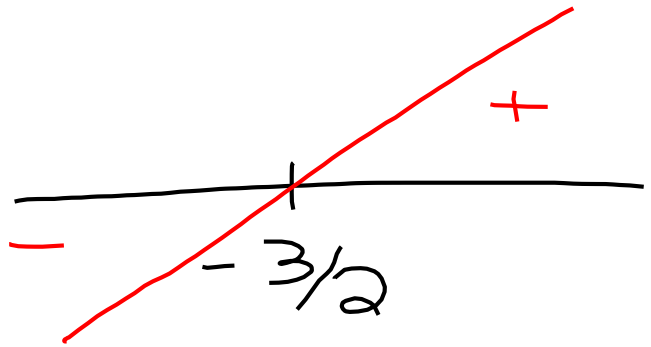
$2x+3>0$ (>0)

down 4



$x > -\frac{3}{2}$

$\left(-\frac{3}{2}, \infty\right)$



HW: p. 4 & 5
Quiz tomorrow

Sign up for Remind (& parents)
Precourse packet due the 12th

$$11.\ f(x) = \log_2 \frac{2x-1}{x-6}$$

$\frac{2x-1}{x-6} > 0$

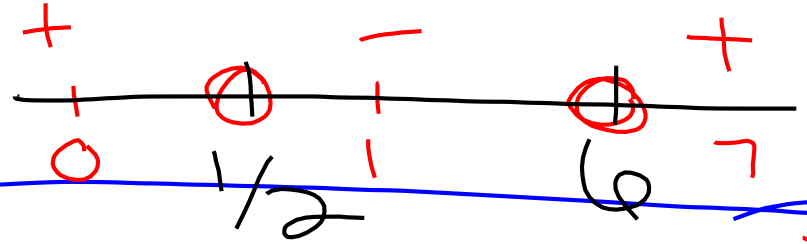
$\frac{2x-1}{x-6} \neq 0$

$0 = 2x-1$

$x\text{-int: } x = 1/2$

$x-6 \neq 0$

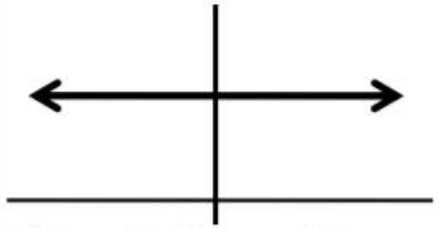
$x \neq 6$



$(-\infty, 1/2) \cup (6, \infty)$

Library Function Graphs

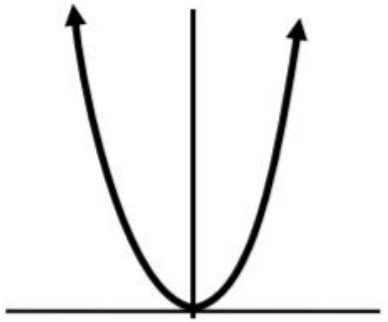
$f(x) = a$ number



Domain : $(-\infty, \infty)$

Range : the number

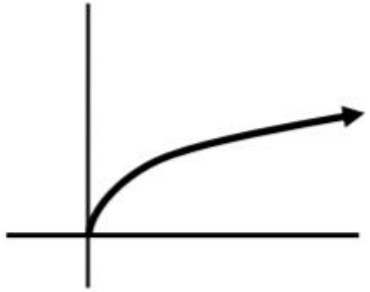
Parabola: $f(x) = x^2$



Domain : $(-\infty\ ,\ \infty)$

Range : $[\ 0\ ,\ \infty\ )$

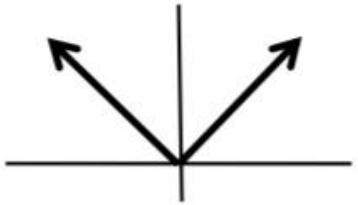
$f(x) = \sqrt{x}$



Domain : $[\ 0\ ,\ \infty\ )$

Range : $[\ 0\ ,\ \infty\ )$

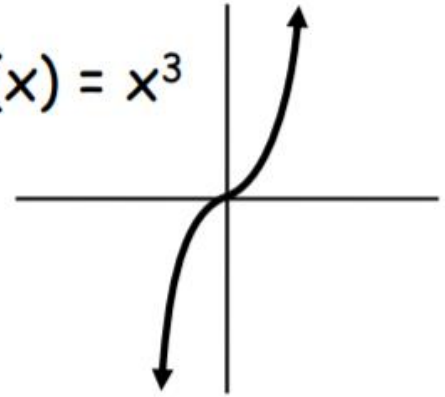
$f(x) = |x|$



Domain : $(-\infty\ ,\ \infty)$

Range : $[\ 0\ ,\ \infty\ )$

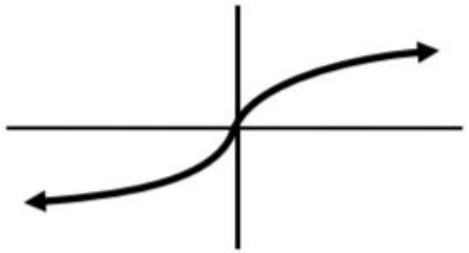
$f(x) = x^3$



Domain : $(-\infty\ ,\ \infty)$

Range : $(-\infty\ ,\ \infty)$

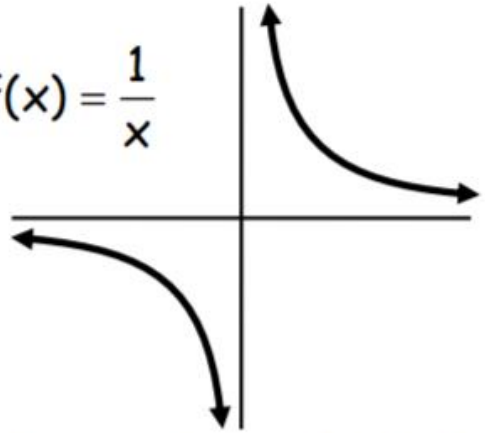
$f(x) = \sqrt[3]{x}$



Domain : $(-\infty\ ,\ \infty)$

Range : $(-\infty\ ,\ \infty)$

$f(x) = \frac{1}{x}$



Domain : $(-\infty\ ,\ 0\ ) \cup (\ 0\ ,\ \infty)$

Range : $(-\infty\ ,\ 0\ ) \cup (\ 0\ ,\ \infty)$