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Domain and Range from Equations Notes

Domain: the set of all input values that yield a REAL number output value

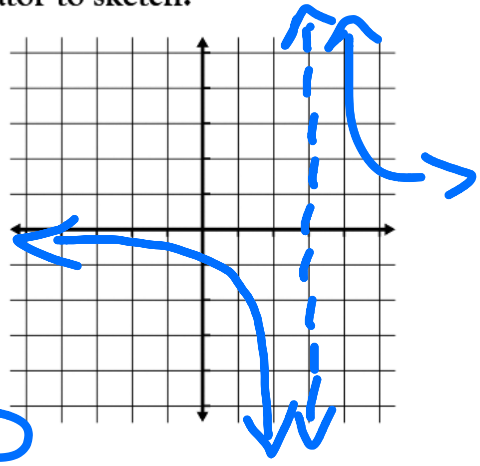
- Domain describes the x values that give a **real** number answer for y

Fill in the table of values below then use your calculator to sketch:

Rational

$y = \frac{4}{2x-6}$

x	y
-2	$-2/5$
-1	$-1/2$
0	$-2/3$
1	-1
2	-2
3	Undef.



In a fraction, the denominator cannot equal $\neq 0$

Domain of $y = \frac{4}{2x-6}$ would be

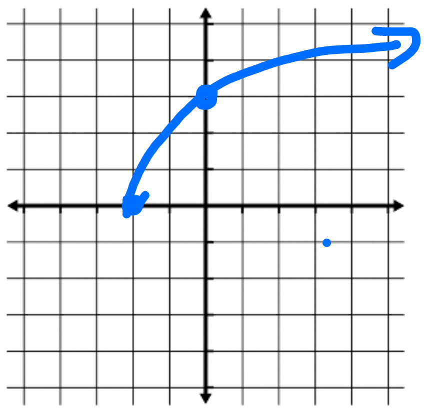
$2x-6 \neq 0$
$x \neq 3$

$D: (-\infty, 3) \cup (3, \infty)$

Square Root

$y = \sqrt{3x+6}$

x	y
-4	$\sqrt{-6}$ not real
-3	$\sqrt{-3}$ not real
-2	0
-1	$\sqrt{3}$
0	$\sqrt{6}$
1	3



Under an **even** radical (square root), the radicand must be ≥ 0

Domain of $y = \sqrt{\underbrace{3x+6}_{\text{radicand}}}$ would be

$3x+6 \geq 0$
$x \geq -2$

$D: [-2, \infty)$

Rational
den. $\neq 0$

Even Root Radical
radicand ≥ 0

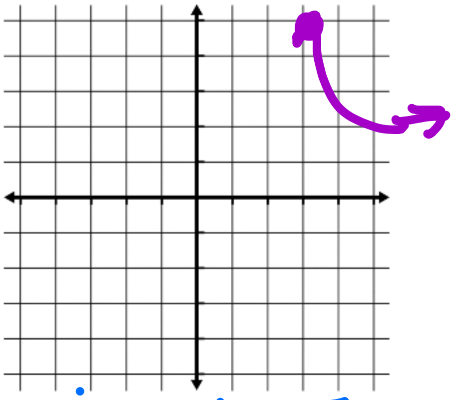
Domain and Range Notes

Fill in the table of values below then use your calculator to sketch:

$y = \frac{8}{\sqrt{x-4}}$

Radical in Denominator

x	y
2	undef.
3	
4	
5	8
6	5.65
7	4.62



For this function, there is a fraction, so $x - 4 \neq 0$

But, there is also a radical, $x - 4 \geq 0$ removing = not equal to 4

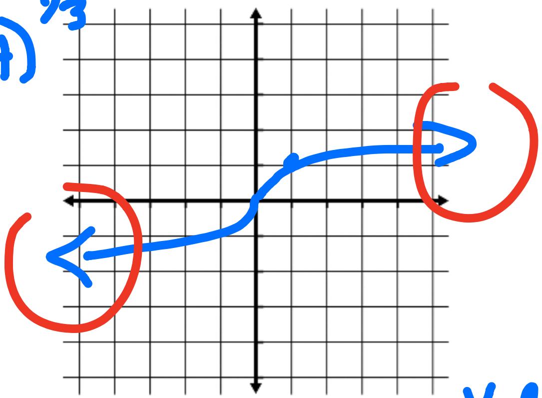
If we put these ideas together, then $x-4>0$

$x>4$

Domain of $y = \frac{3}{\sqrt{x-4}}$ would be D: $(4, \infty)$

What about $y = \sqrt[3]{x-4}$ or $(x-4)^{1/3}$

x	y
3	-1
4	0
5	1



Domain of $y = \sqrt[3]{x-4}$

would be: $(-\infty, \infty)$

Can take cube root of negative number

Domain and Range Notes

Domain Review:

In a fraction, the denominator can't equal zero

Under an even radical, the radicand must be ≥ 0

Rational Function

1. $f(x) = \dfrac{3}{8x+4}$ Domain: $(-\infty, -\frac{1}{2}) \cup (-\frac{1}{2}, \infty)$

$8x + 4 \neq 0$
$8x \neq -4$
$x \neq -\frac{1}{2}$

all real numbers except $-\frac{1}{2}$

Square Root

2. $f(x) = \sqrt{3x-6}$ Domain: $[2, \infty)$

$3x - 6 \geq 0$
$x \geq 2$

Domain is all real numbers greater than or equal to 2.

Rad in denom.

3. $f(x) = \dfrac{8}{\sqrt{x+6}}$ Domain: $(-6, \infty)$

$x + 6 > 0$
$x > -6$

Domain is all real #'s greater than -6

4. $f(x) = x^2 + 5x - 6$ Domain: $(-\infty, \infty)$

$\mathbb{R}$

Quadratic Function

Domain and Range Notes

Find the domain of the following functions:

1. $f(x) = \dfrac{3}{x-2}$

Domain: $(-\infty, 2) \cup (2, \infty)$

2. $f(x) = \dfrac{3}{x^2 - 9}$

$x^2 - 9 \neq 0$

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

$x \neq 3 \quad x \neq -3$

Domain: $(-\infty, -3) \cup (-3, 3) \cup (3, \infty)$

3. $f(x) = \sqrt{x-4}$

Domain: $[4, \infty)$

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

Domain: $(-1, \infty)$

5. $f(x) = \dfrac{3}{x^2+6x+8}$

$x^2+6x+8 \neq 0$

$(x+4)(x+2) \neq 0$

$x \neq -4$

$x \neq -2$

Domain: $(-\infty, -4) \cup (-4, -2) \cup (-2, \infty)$

6. $f(x) = \dfrac{2x+3}{x^2+9}$

(11)

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

7. $f(x) = |x+2|$

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

8. $f(x) = \sqrt[3]{x-4}$

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

Domain and Range from Equation Practice **name**____________________________

The domain of a function *f* is taken to be the set consisting of every real number for which the rule of *f* produces a real number.

Determine the domain of the function.

1. $f(x) = x^2$
2. $f(x) = x + 5$
3. $f(x) = -5x + 4$

Find the domain of each function:

1. $k(x) = \dfrac{x^2 - 6x}{x - 1}$
2. $f(t) = \sqrt{t + 2}$
3. $f(x) = \dfrac{4}{\sqrt{x - 9}}$
4. $h(t) = \sqrt{4 - 3t}$
5. $f(x) = \dfrac{x}{x^2 + 1}$
6. $f(x) = \dfrac{x}{x^2 - 16}$
7. $h(x) = \dfrac{2x}{x^2 - 4}$
8. $h(x) = \sqrt{3x - 12}$
9. $f(x) = \sqrt{1 - x}$
10. $g(x) = \dfrac{3x}{x^2 - 4}$

11. $f(x) = \frac{x}{x-4}$

12. $q(x) = \sqrt{-x-2}$

13. $f(x) = \frac{3x^2 - x + 7}{x^2 + 2x - 3}$

14. $g(x) = \sqrt{x} + 5$

***15. $g(x) = \sqrt{x^2 + 6x + 8}$

***16. $g(x) = \frac{3}{\sqrt{x^2 - 8x + 15}}$

****17. $f(x) = \sqrt{x^2 + 2x - 15}$

***18. $f(x) = \frac{7}{\sqrt{x^2+3x-10}}$