Lesson 1.5 Objective: SWBAT determine the domain and range and find the domain algebraically.

Kickoff- Evaluate the difference quotient with the following expressions. When done work on the matching activity from yesterday!

1) f(x) = 6x-1

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

$\frac{[6(x+h)-1]-[6x-1]}{h}$

$\frac{6x+6h-1-6x+1}{h}$

$\frac{6h}{h}=6$

2) k(x) = x^2-2x

$\frac{[(x+h)^2-2(x+h)]-[x^2-2x]}{h}$

$\frac{x^2+2xh+h^2-2x-2h-x^2+2x}{h}$

$\frac{2xh+h^2-2h}{h}$

$\frac{h(2x+h-2)}{h}$

$2x+h-2$

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① D: all real #'s
R: $y \le 1$

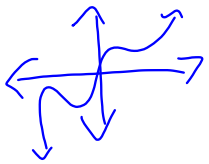
② D: $\mathbb{R}$
R: $\mathbb{R}$

③ D: $x \le -1$ and $x \ge 1$
R: $y \ge 0$

④ D: $-4 \le x \le 4$
R: $0 \le y \le 4$

⑤ D: $\mathbb{R}$
R: $y \ge 0$

⑥ D: $\mathbb{R}$
R: $y \le 0$



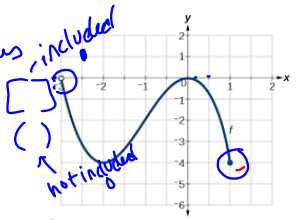
Domain and Range

↳x-values ↳y-values

Interval Notation [ ] ( )

D: (-3, 1]

R: [-4, 0]



Inequalities

D: $-3 < x \le 1$

R: $-4 \le y \le 0$

Set Notation

★ {ℝ}

↑ all real #'s

Domain Algebraically

To find out where a function is defined, we must first find out where the function is not defined.

Ex1: $k(x)=\sqrt{4-3x}$ $\sqrt{\ } \ge 0$

$4-3x \ge 0$

$-4 \quad -4$

$\frac{-3x \ge -4}{-3 \quad -3}$

$x \le 4/3$

Ex2: $f(x)=\frac{1}{x^2-4}$ $\frac{1}{\ } = 0$

$x^2-4=0$

$+4 \quad +4$

$\sqrt{x^2}=\sqrt{4}$

$x=\pm 2$

★ {ℝ except $x=\pm 2$}

For each of the following functions, determine the domain algebraically (and confirm graphically), and determine the range graphically.

1) $f(x)=3x^2-6$ Quadratic!

D: ℝ

R: $y \ge -6$

2) $g(x)=\frac{1}{x-1}$

D: {ℝ except $x=1$}

R: {ℝ except $y=0$}

3) $h(x)=\sqrt{3-x}$

$3-x \ge 0$

$-3 \quad -3$

$\frac{-x \ge -3}{-1 \quad -1}$

D: $x \le 3$

R: $y \ge 0$

★ 4) $j(x)=\frac{\sqrt{x}}{x-4}$

$x-4 \ne 0$

$x \ne 4$

$x \ge 0$

D: $x \ge 0$ except $x=4$

5) $k(x) = \dfrac{x^2 - 3x + 6}{x^2 - 3x - 10}$

6) $m(x) = \dfrac{2x}{\sqrt{x^2 - 9}}$

7) $n(x) = \sqrt{8x^3 - 24x^2}$

8) $p(x) = \dfrac{\sqrt{x-3}}{\sqrt{x+4}}$

_____ 1. Domain: $\{-4 \le x \le 4\}$ Range: $\{-4 \le y \le 4\}$ Function: NO	_____ 2. Domain: $\{-3 < x \le 5\}$ Range: $\{y = -1\}$ Function: YES	_____ 3. Domain: $\{-4 \le x \le 2\}$ Range: $\{-2 \le y \le 4\}$ Function: YES
_____ 4. Domain: $\{x > 0\}$ Range: $\{y = 4\}$ Function: YES	_____ 5. Domain: $\{-6 \le x \le 6\}$ Range: $\{0 \le y \le 6\}$ Function: YES	_____ 6. Domain: $\{x = -5\}$ Range: $\{-2 < y < 6\}$ Function: NO

_____ 7. Domain: $\{x \ge 0\}$ Range: {all real numbers} Function: NO	_____ 8. Domain: $\{-3 \le x \le 4\}$ Range: $\{-2 \le y \le 4\}$ Function: NO	_____ 9. Domain: {all real numbers} Range: {all real numbers} Function: YES
_____ 10. Domain: $\{-7 \le x < 5\}$ Range: $\{-3 \le y < 1\}$ Function: YES	_____ 11. Domain: {all real numbers} Range: $\{y \ge 0\}$ Function: YES	_____ 12. Domain: $\{-3 < x < 4\}$ Range: $\{0 \le y \le 5\}$ Function: YES

_____ 13. Domain: $\{-6 \le x \le 3\}$ Range: $\{-6 \le y \le -1\}$ Function: YES	_____ 14. Domain: $\{0 \le x < 5\}$ Range: $\{0 \le y < 7\}$ Function: YES	_____ 15. Domain: $\{-5 \le x < 0\}$ Range: $\{-5 < y \le -1\}$ Function: YES
_____ 16. Domain: $\{-6 \le x \le 3\}$ Range: $\{-5 \le y \le -1\}$ Function: YES	_____ 17. Domain: $\{0 \le x \le 6\}$ Range: $\{0 \le y \le 7\}$ Function: YES	_____ 18. Domain: $\{-4 \le x \le 7\}$ Range: $\{-7 \le y \le -2\}$ Function: NO