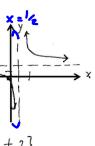


For each of the following,

- State the type of trouble.
- Find the domain algebraically.
- Sketch the graph.
- Use the graph to find the range.

1. $y = \frac{4x}{2x-1}$

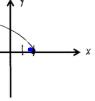
a. Var in denominator
 $2x-1=0$
 $x = \frac{1}{2}$

b. $\{x | x \neq \frac{1}{2}\}$
c. 

d. $\{y | y \neq 0\}$

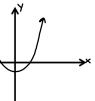
2. $y = \sqrt{8-4x}$

a. variable under 1^2
 $8-4x \geq 0$
 $-4x \geq -8$
 $x \leq 2$

b. $\{x | x \leq 2\}$
c. 

d. $\{y | y \geq 0\}$

3. $y = 2x^2 - 1$

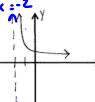
a. no trouble
c. 

b. $(-\infty, \infty)$
d. $\{y | y \geq -1\}$

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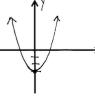
4. $y = \frac{5}{\sqrt{2x+4}}$

a. double trouble
var under 1^2 in denom
 $2x+4 > 0$
 $2x > -4$
 $x > -2$

b. $\{x | x > -2\}$
c. 

d. $\{y | y > 0\}$

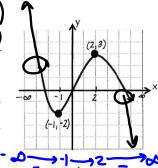
5. $y = x^2 - 3$

a. no trouble
c. 

b. $(-\infty, \infty)$
d. $\{y | y \geq -3\}$

6. State the domain and range for the function below. Determine the intervals on which the graph is increasing and decreasing. Find all relative minima and maxima.

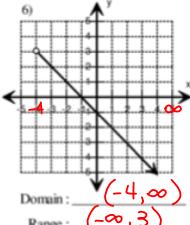
Domain: $\{x | x \in \mathbb{R}\}$ $(-\infty, \infty)$
Range: $\{y | y \in \mathbb{R}\}$ $(-\infty, \infty)$
Increasing: $(-1, 2)$
Decreasing: $(-\infty, -1), (2, \infty)$
Relative Min: $(-1, -2)$
Relative Max: $(2, 3)$



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Warm-Up: Find the domain and range and the average rate of change for number 6 on the warm-up sheet.

Slope
 $-1 = \text{avg rate of change}$

6) 

Domain: $(-4, \infty)$
Range: $(-\infty, 3)$

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Operations with Functions

Rules

$(f + g)(x) = f(x) + g(x)$
 $(f - g)(x) = f(x) - g(x)$
 $(f \cdot g)(x) = f(x) \cdot g(x)$
 $\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}, \text{ where } g(x) \neq 0$

Domains: consist of x-values that are in the domain of BOTH f and g.

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Let $f(x) = 2x + 3$ and $g(x) = \sqrt{x} + x$, find the following:

- $(f + g)(4) : f(4) + g(4)$
 $: 11 + 6 : 17$
- $(f - g)(1) : f(1) - g(1)$
 $: 5 - 2$
 $= 3$
- $(f \cdot g)(x) : f(x) + g(x)$
 $: 2x + 3 + \sqrt{x} + x$
 $: 3x + 3 + \sqrt{x}$
Domain: $\{x | x \geq 0\}$
- $(f \cdot g)(x) : f(x) - g(x)$
 $: 2x + 3 - \sqrt{x} - x$
 $: x + 3 - \sqrt{x}$
Domain: $\{x | x \geq 0\}$

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Let $f(x) = x^2 - 4$ and $g(x) = x - 2$, find the following:

5. $(f \circ g)(-1) : f(-1) \cdot g(-1)$

$$: -3 \cdot -3$$

$$: 9$$

7. $(f \circ g)(x) : f(x) \cdot g(x)$

$$: (x^2 - 4)(x - 2)$$

$$: x^3 - 2x^2 - 4x + 8$$

Domain:

$$(-\infty, \infty)$$

6. $\left(\frac{f}{g}\right)(4) : \frac{f(4)}{g(4)}$

$$: \frac{12}{2} = 6$$

8. $\left(\frac{f}{g}\right)(x) : \frac{f(x)}{g(x)} \cdot \frac{x^2 - 4}{x - 2}$

$$: \frac{(x-2)(x+2)}{(x-2)} = x^2$$

Domain: $x-2 \neq 0 \quad \{x | x \neq 2\}$

Let $f(x) = 3x^2 - 11x - 4$ and $g(x) = (3x + 1)$, find each of the following:

9. $g(2n-1) : (2n-1)(2n+1)$

$$: 3(2n-1)+1$$

$$: 6n-3+1$$

$$: 6n-2$$

10. $f(2n) : (2n)^2 - 11(2n) - 4$

$$: 3(2n)^2 - 11(2n) - 4$$

$$: 12n^2 - 22n - 4$$

11. $(f+g)(x) : f(x) + g(x)$

$$: 3x^2 - 11x - 4 + 3x + 1$$

$$: 3x^2 - 8x - 3$$

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

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

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Let $f(x) = 3x^2 - 11x - 4$ and $g(x) = (3x + 1)$, find each of the following:

13. $\left(\frac{f}{g}\right)(x) : \frac{f(x)}{g(x)} : \frac{(x-4)(3x+1)}{(3x+1)}$

$$3x+1=0$$

$$x = -\frac{1}{3}$$

$$\{x | x \neq -\frac{1}{3}\}$$

Aside: $3x^2 - 11x - 4$ P: -12 $\{x | x \neq 4, -\frac{1}{3}\}$

$$3x^2 - 12x + 1 \neq 0$$

$$3x(x-4) + 1(x-4)$$

$$(x-4)/(3x+1)$$

Domain: _____

Domain: _____

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Dec 4-7:47 AM