

For each of the following, a. State the type of trouble. b. Find the domain algebraically. c. Sketch the graph. d. Use the graph to find the range.

Alg2 HW 6.3

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

a. var in denominator
 $2x-1=0$

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

c.

d. $\{y | y \neq 2\}$

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

a. variable under sqrt
 $8-4x \geq 0$
 $-4x \geq -8$

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

c.

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

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

a. no trouble

b. $(-\infty, \infty)$

c.

d. $\{y | y \geq -1\}$

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

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

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

c.

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

5. $y = x^2 - 3$

a. no trouble

b. $(-\infty, \infty)$

c.

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.

6)

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

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

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

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Operations with Functions

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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:

1. $(f+g)(4) : f(4) + g(4)$
 $: 11 + 6 : 17$

2. $(f-g)(1) : f(1) - g(1)$
 $: 5 - 2$
 $: 3$

3. $(f+g)(x) : f(x) + g(x)$
 $: 2x + 3 + \sqrt{x} + x$
 $: 3x + 3 + \sqrt{x}$
Domain: $\{x | x \geq 0\}$

4. $(f-g)(x) : f(x) - g(x)$
 $: 2x + 3 - \sqrt{x} - x$
 $: x + 3 - \sqrt{x}$
Domain: $\{x | x \geq 0\}$

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

5. $(f \circ g)(-1) : f(-1) \cdot g(-1)$
 $: -3 \cdot -3$
 $: 9$

6. $\left(\frac{f}{g}\right)(4) : \frac{f(4)}{g(4)}$
 $: \frac{12}{2} : 6$

7. $(f \circ g)(x) : f(x) \cdot g(x)$
 $: (x^2 - 4)(x - 2)$
 $: x^3 - 2x^2 - 4x + 8$
 Domain: $(-\infty, \infty)$

8. $\left(\frac{f}{g}\right)(x) : \frac{f(x)}{g(x)} = \frac{x^2 - 4}{x - 2}$
 $: \frac{(x-2)(x+2)}{(x-2)} = x+2$
 Domain: $\{x | x \in \mathbb{R}\}$ $x-2 \neq 0 \{x | x \neq 2\}$

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

9. $g(2n-1)$
 $: 3(2n-1) + 1$
 $: 6n - 3 + 1$
 $: 6n - 2$

10. $f(2n)$
 $(2n)(2n) : 4n^2$
 $: 3(2n)^2 - 11(2n) - 4$
 $: 12n^2 - 22n - 4$

11. $(f + g)(x) : f(x) + g(x)$
 $: 3x^2 - 11x - 4 + 3x + 1$
 $: 3x^2 - 8x - 3$
 Domain: $(-\infty, \infty)$

12. $(f - g)(x) : f(x) - g(x)$
 $: 3x^2 - 11x - 4 - 3x - 1$
 $: 3x^2 - 14x - 5$
 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. $\left(\frac{f}{g}\right)(x) : \frac{f(x)}{g(x)} : \frac{(x-4)(3x+1)}{(3x+1)}$
 $3x+1=0$
 $x=-\frac{1}{3}$
 $\{x | x \neq -\frac{1}{3}\}$

14. $\left(\frac{g}{f}\right)(x) : \frac{g(x)}{f(x)} : \frac{3x+1}{(x-4)(3x+1)}$
 $: \frac{1}{x-4}$
 $\{x | x \neq 4, -\frac{1}{3}\}$

Aside $3x^2 - 11x - 4$ P: -12
 $3x^2 - 12x + 1x - 4$ S: -11
 $3x(x-4) + 1(x-4)$ -12, 1
 $(x-4)(3x+1)$

Domain: _____

Domain: _____

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Dec 4-7:47 AM