

For each of the following,

Alg2 HW 6.3

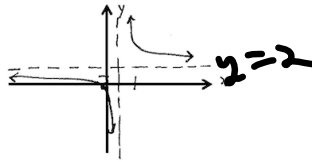
Quizzes Monday (Days 1-3) & Wednesday
when we return.

HW 6.4 Due Monday, December 2nd

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

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

c.



$$\begin{array}{r} 2 = \frac{4x}{2x-1} \\ 2(2x-1) = 4x \\ 4x-2 = 4x \\ -4x \quad -4x \\ \hline -2 \neq 0 \end{array}$$

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

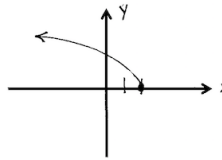
d.

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

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

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

c.

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

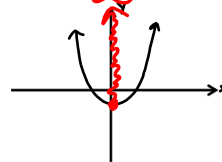
d.

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

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

a. no trouble

c.

b. $\{x | x \in \mathbb{R}\}$

d.

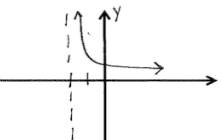
 $\{y | y \geq -1\}$
 $[-1, \infty)$

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

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

c.

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

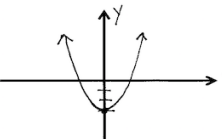
d.

 $\{y | y > 0\}$

5. $y = x^2 - 3$

a. no trouble

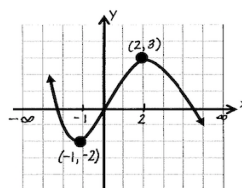
c.

b. $\{x | x \in \mathbb{R}\}$

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

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Operations with Functions

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Rules

$$(f + g)(x) = f(x) + g(x)$$

$$(f - g)(x) = f(x) - g(x)$$

$$(f \cdot g)(x) = f(x) \cdot g(x)$$

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

Recall

$$\frac{1}{x} \quad \sqrt{x} \quad \frac{1}{\sqrt{x}}$$

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denom $\neq 0$ radicand ≥ 0 radicand > 0

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

$$\begin{aligned} 1. \quad (f+g)(4) &= f(4) + g(4) \\ &= 2(4) + 3 + \sqrt{4} + 4 \\ &= 11 + 2 + 4 \\ &= \boxed{17} \end{aligned}$$

$$\begin{aligned} 2. \quad (f-g)(1) &= f(1) - g(1) \\ &= 2(1) + 3 - (\sqrt{1} + 1) \\ &= 5 - (2) = \boxed{3} \end{aligned}$$

$$\begin{aligned} 3. \quad (f+g)(x) &= f(x) + g(x) \\ &= 2x + 3 + \sqrt{x} + x \\ &= 3x + 3 + \sqrt{x} \end{aligned}$$

radicand ≥ 0

Domain: $\{x \mid x \geq 0\}$

$$\begin{aligned} 4. \quad (f-g)(x) &= f(x) - g(x) \\ &= 2x + 3 - (\sqrt{x} + x) \\ &= 2x + 3 - \sqrt{x} - x \\ &= x + 3 - \sqrt{x} \end{aligned}$$

Domain: $\{x \mid x \geq 0\}$

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

$$\begin{aligned} 5. \quad (f \cdot g)(-1) &= f(-1) \cdot g(-1) \\ &= [(-1)^2 - 4] \cdot [-1 - 2] \\ &= [1 - 4] \cdot [-3] \\ &= (-3)(-3) = \boxed{9} \end{aligned}$$

$$\begin{aligned} 6. \quad \left(\frac{f}{g}\right)(4) &= \frac{f(4)}{g(4)} = \frac{4^2 - 4}{4 - 2} \\ &= \frac{16 - 4}{2} = \frac{12}{2} = \boxed{6} \end{aligned}$$

$$\begin{aligned} 7. \quad (f \cdot g)(x) &= f(x) \cdot g(x) \\ &= (x^2 - 4)(x - 2) \\ &= x^2(x - 2) - 4(x - 2) \\ &= x^3 - 2x^2 - 4x + 8 \end{aligned}$$

Domain: $\{x \mid x \in \mathbb{R}\}$

$$\begin{aligned} 8. \quad \left(\frac{f}{g}\right)(x) &= \frac{f(x)}{g(x)} = \frac{x^2 - 4}{x - 2} \\ &= \frac{(x+2)(x-2)}{(x-2)} = x + 2 \end{aligned}$$

Domain: $\{x \mid x \neq 2\}$

denom $\neq 0$
 $x \neq 2$

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

11. $(f+g)(x) = f(x) + g(x)$
 $= 3x^2 - 11x - 4 + 3x + 1$
 $= 3x^2 - 8x - 3$

12. $(f-g)(x) = f(x) - g(x)$
 $= 3x^2 - 11x - 4 - (3x + 1)$
 $= 3x^2 - 11x - 4 - 3x - 1$
 $= 3x^2 - 14x - 5$

Domain: $\{x | x \in \mathbb{R}\}$

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

13. $\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}$
 $= \frac{(3x^2 - 11x - 4)}{(3x + 1)}$

$3x^2 - 11x - 4 = (x-4)(3x+1)$
 $p = -12$
 $s = -11$
 $1, 12$

$3x^2 - 12x + 1x - 4$
 $3x(x-4) + 1(x-4)$
 $(x-4)(3x+1)$

$\cancel{(x-4)}$
 $\text{denom} \neq 0$
 $3x+1 \neq 0$
 $3x \neq -1$
 $x \neq -\frac{1}{3}$

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

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

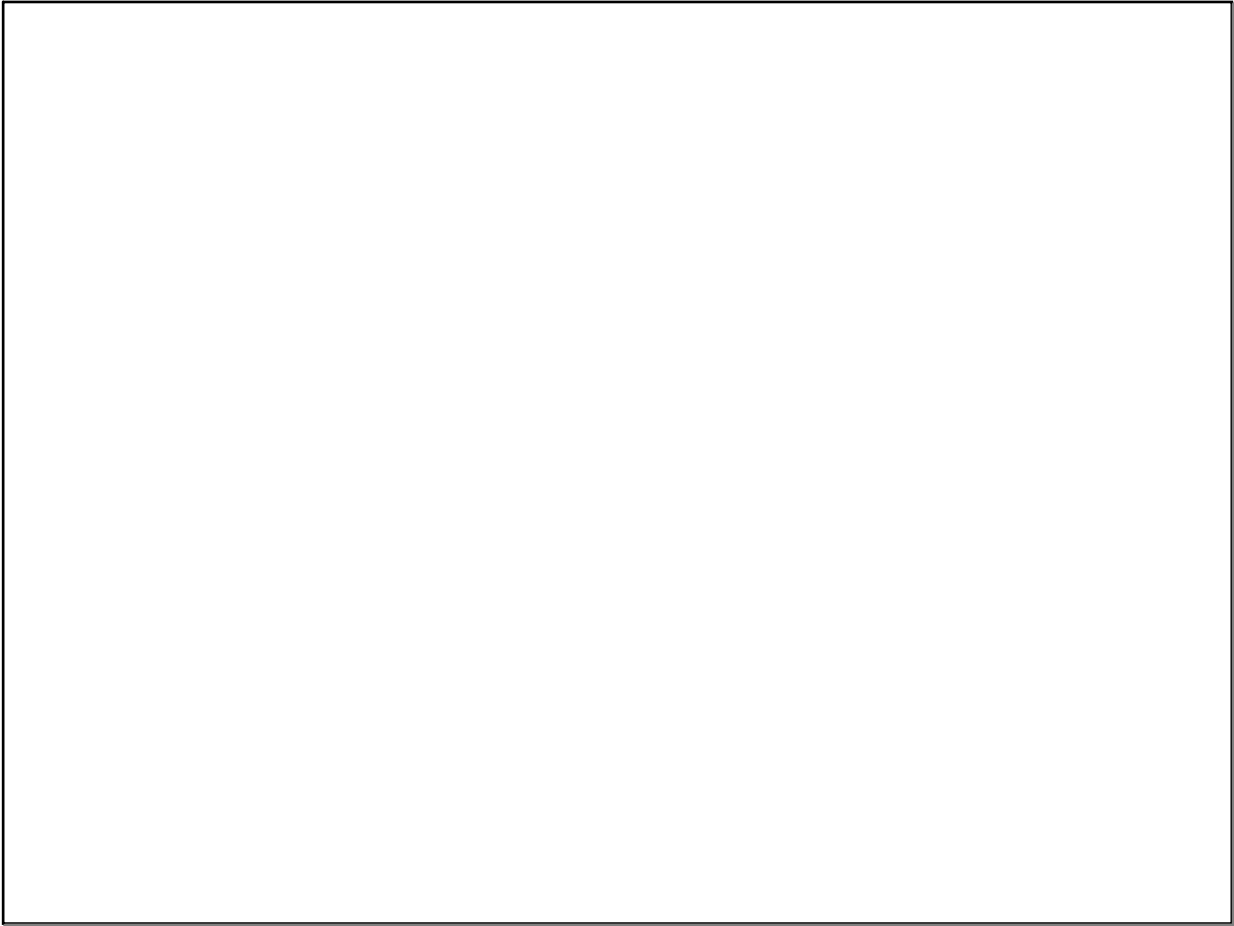
$(x-4)(3x+1) \neq 0$

$3x+1 \neq 0$
 $x \neq -\frac{1}{3}$

$x-4 \neq 0$
 $x \neq 4$

Domain: $\{x | x \neq -\frac{1}{3}, 4\}$

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