

$$15x^2 + 40x + 25 \neq 0 \quad 5(3x^2 + 8x + 5) \neq 0$$

$$5(3x^2 + 8x + 5) \neq 0 \rightarrow 5(3x(x+1) + 5(x+1)) \neq 0$$

Module 7 - Rational Functions

$$\underline{5(3x+5)(x+1) \neq 0}$$

Progress Exam 3

31. Determine the domain of the function below.

$$1. 3x+5 \neq 0$$

$$3x \neq -5$$

$$x \neq -\frac{5}{3}$$

$$f(x) = \frac{4}{15x^2 + 40x + 25}$$

- A. All Real numbers except $x = a$ and $x = b$, where $a \in [-25.2, -24.5]$ and $b \in [-16.2, -14.5]$

- B. All Real numbers except $x = a$ and $x = b$, where $a \in [-1.3, -0.5]$ and $b \in [-3, -1.5]$
- C. All Real numbers except $x = a$, where $a \in [-1.3, -0.5]$
- D. All Real numbers except $x = a$, where $a \in [-25.2, -24.5]$
- E. All Real numbers.

→ DOMAIN IS ALL REAL NUMBERS EXCEPT $-\frac{5}{3}$ AND -1

32. Solve the rational equation below. Then, choose the interval(s) that the solution(s) belongs to.

$$-4 - \frac{9}{-3x+2} = \frac{-7}{-24x+16}$$

- A. $x_1 \in [-0.17, 0.14]$ and $x_2 \in [0, 3]$
- B. All solutions lead to invalid or complex values in the equation.
- C. $x \in [1.31, 1.48]$
- D. $x \in [-0.17, 0.14]$
- E. $x_1 \in [0.83, 1.03]$ and $x_2 \in [0, 3]$
- $\underline{-24x+16 = 8(-3x+2)}$

33. Solve the rational equation below. Then, choose the interval(s) that the solution(s) belongs to.

$$\frac{3x}{-2x-4} - \frac{6x^2}{-6x^2-6x+12} = \frac{4}{3x-3}$$

- A. $x_1 \in [-4, 0]$ and $x_2 \in [-4, 3]$
- B. $x \in [-4, 0]$
- C. $x_1 \in [-1, 5]$ and $x_2 \in [-4, 3]$
- D. $x \in [-1, 5]$
- E. All solutions lead to invalid or complex values in the equation.

32.
$$\left(-4 - \frac{9}{-3x+2} = \frac{-7}{8(-3x+2)} \right) 8(-3x+2)$$

DOMAIN:
 $-3x+2 \neq 0$
 $-3x \neq -2$
 $x \neq \frac{2}{3} = 0.\overline{6}$

$-4(8(-3x+2)) - 9(8) = -7$
 $-32(-3x+2) - 72 = -7$
 $96x - 64 - 72 = -7$
 $96x - 136 = -7$
 $96x = 129$
 $x = \frac{129}{96} = 1.34$

\Rightarrow DOMAIN IS ALL REAL NUMBERS EXCEPT $0.\overline{6}$

IN THE DOMAIN!

33.

$$\left[\frac{3x}{-2x-4} - \frac{6x^2}{(-2x-4)(3x-3)} = \frac{4}{3x-3} \right] (-2x-4)(3x-3)$$

$3x(3x-3) - 6x^2 = 4(-2x-4)$
 $9x^2 - 9x - 6x^2 = -8x - 16$
 $3x^2 - 9x = -8x - 16$
 $3x^2 - x + 16 = 0$

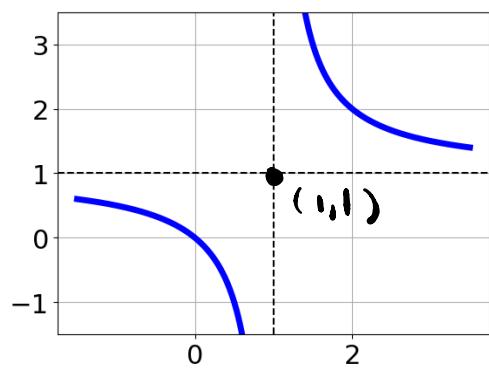
$$x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(3)(16)}}{2(3)}$$

$x = \frac{1 \pm \sqrt{-191}}{6}$

CANNOT TAKE SQUARE ROOT OF A NEGATIVE!
 \Rightarrow NO REAL SOLUTIONS

34. Choose the equation of the function graphed below.

*PARENT FUNCTION IS $\frac{1}{x}$
 $a > 0 \Rightarrow a = 1$
 $(h, k) = (1, 1)$



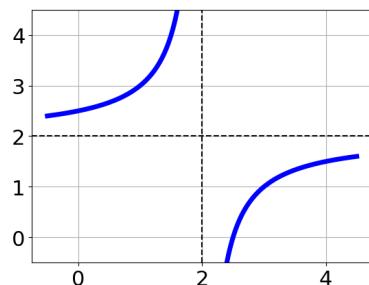
$$f(x) = \frac{a}{x-h} + k = \frac{1}{x-1} + 1$$

- A. $f(x) = \frac{1}{x-1} + 1$
 B. $f(x) = \frac{-1}{(x+1)^2} + 1$
 C. $f(x) = \frac{1}{(x-1)^2} + 1$
 D. $f(x) = \frac{-1}{x+1} + 1$

35. Choose the graph of the equation below.

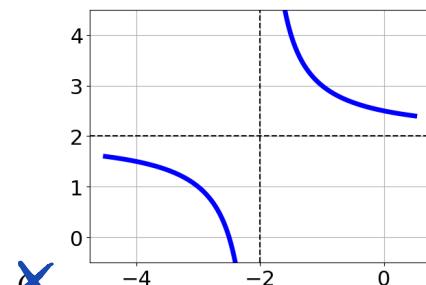
*PARENT FUNCTION IS $\frac{1}{x^2}$
 $a = -1 \Rightarrow a < 0$
 $(h, k) = (2, 2)$

X

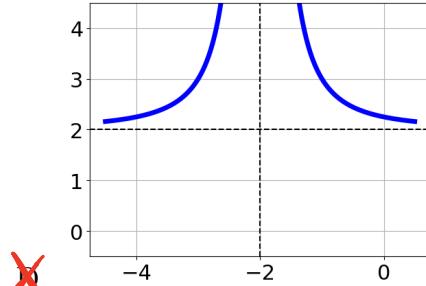


(B.)

$$f(x) = \frac{-1}{(x-2)^2} + 2$$



X



X

36. Which of the following intervals describes the Range of the function below?

$$f(x) = \log_2(x - 7) + 8$$

- A. $(-\infty, a), a \in [-8.75, -7.96]$
- B. $(-\infty, a], a \in [-7.08, -6.55]$
- C. $(-\infty, a), a \in [7.21, 8.03]$
- D. $[a, \infty), a \in [5.26, 7.92]$
- E. $(-\infty, \infty)$

★ RANGE OF LOGARITHM FUNCTIONS IS ALWAYS $(-\infty, \infty)$

37. Which of the following intervals describes the Domain of the function below?

$$f(x) = -e^{x-8} - 7$$

- A. $(a, \infty), a \in [4, 10]$
- B. $(-\infty, a), a \in [-12, -3]$
- C. $[a, \infty), a \in [4, 10]$
- D. $(-\infty, a], a \in [-12, -3]$
- E. $(-\infty, \infty)$

★ DOMAIN OF EXPONENTIAL FUNCTIONS IS ALWAYS $(-\infty, \infty)$

38. Solve the equation for x and choose the interval that contains the solution (if it exists).

$$\log_3(-3x + 5) + 4 = 3$$

- A. $x \in [-1.34, -0.85]$
- B. $x \in [1.48, 1.94]$
- C. $x \in [1.81, 2.61]$
- D. $x \in [-7.76, -6.17]$

$$\begin{array}{rcl} -4 & = & -4 \\ \hline \log_3(-3x+5) & = & -1 \end{array}$$

TO

E. There is no Real solution to the equation.

"3 TO THE -1 POWER EQUALS $-3x+5$ "

$$\begin{aligned} 3^{-1} &= -3x + 5 \\ \frac{1}{3} &= -3x + 5 \\ \frac{1}{3} - 5 &= -3x \end{aligned}$$

$$\begin{aligned} -\frac{4.6}{-3} &= -\frac{3x}{-3} \\ 1.5 &= x \end{aligned}$$

39. Solve the equation for x and choose the interval that contains x (if it exists).

$$16 = \ln \sqrt{\frac{25}{e^x}}$$

$$16 = \ln \left(\left(\frac{25}{e^x} \right)^{\frac{1}{2}} \right)$$

$$16 = \frac{1}{2} \left[\ln \left(\frac{25}{e^x} \right) \right]$$

$$16 = \frac{1}{2} \left[\ln(25) - \ln(e^x) \right]$$

$$16 = \frac{1}{2} \left[\ln(25) - x \right]$$

$$\left(16 - \frac{\ln(25)}{2} \right) = -\frac{x}{2}$$

$$-32 + \ln(25) = x$$

$$-28.78 = x$$

A. $x \in [-17, -13]$
 B. $x \in [13, 18]$
 C. $x \in [27, 33]$
 D. $x \in [-29, -26]$
 E. There is no solution to the equation.

40. Solve the equation for x and choose the interval that contains the solution (if it exists).

$$2^{-2x+5} = \left(\frac{1}{27} \right)^{-4x-5}$$

$$2^{-2x+5} = \frac{1}{27^{-4x-5}}$$

$$\ln(2^{-2x+5}) = \ln\left(\frac{1}{27^{-4x-5}}\right)$$

A. $x \in [-0.95, -0.37]$
 B. $x \in [-3.7, -2]$
 C. $x \in [0.1, 1.48]$
 D. $x \in [2.4, 3.24]$
 E. There is no Real solution to the equation.

$$(-2x+5)\ln(2) = \ln(1) - \ln(27^{-4x-5})$$

$$-2x\ln(2) + 5\ln(2) = 0 - (-4x-5)\ln(27)$$

$$-2x\ln(2) + 5\ln(2) = -[-4x\ln(27) - 5\ln(27)]$$

$$-2x\ln(2) + 5\ln(2) = 4x\ln(27) + 5\ln(27)$$

$$+2x\ln(2)$$

$$5\ln(2) = 4x\ln(27) + 2x\ln(2) + 5\ln(27)$$

$$-5\ln(27) = -5\ln(27)$$

$$5\ln(2) - 5\ln(27) = 4x\ln(27) + 2x\ln(2)$$

$$5\ln(2) - 5\ln(27) = x(4\ln(27) + 2\ln(2))$$

$$\frac{5\ln(2) - 5\ln(27)}{4\ln(27) + 2\ln(2)} = x \Rightarrow x = -0.89$$