$3x-2\neq 0$
$3x\neq 2$
$x\neq \frac{2}{3} \Rightarrow x\neq 0.\overline{6}$

$3x+5\neq 0$
$3x\neq -5$
$x\neq -\frac{5}{3} \Rightarrow x\neq -1.\overline{6}$

DOMAIN IS ALL REAL NUMBERS EXCEPT $x=0.\overline{6}$ AND $x=-1.\overline{6}$

31. Determine the domain of the function below.

$$f(x) = \frac{6}{18x^2+18x-20} = \frac{6}{2(9x^2+9x-10)} = \frac{6}{2(3x-2)(3x+5)}$$

A. All Real numbers except $x = a$, where $a \in [22.5, 25.4]$

B. All Real numbers except $x = a$, where $a \in [-0.3, 2.4]$

C. All Real numbers.

D. All Real numbers except $x = a$ and $x = b$, where $a \in [-0.3, 2.4]$ and $b \in [-2.4, -0.3]$

E. All Real numbers except $x = a$ and $x = b$, where $a \in [22.5, 25.4]$ and $b \in [-15.4, -14]$

★ TWO FACTORS THAT MULTIPLY TO -90 AND ADD TO 9 ARE 15, -6

$9x^2+9x-10$
$=9x^2+15x-6x-10$
$=3x(3x+5)-2(3x+5) = (3x-2)(3x+5)$

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

$$-8 - \frac{3}{-2x-9} = \frac{8}{-12x-54}$$

A. $x \in [-4.54, -4.15]$

B. $x_1 \in [4.28, 5.14]$ and $x_2 \in [-5, -3]$

C. All solutions lead to invalid or complex values in the equation.

D. $x \in [4.28, 5.14]$

E. $x_1 \in [-3.84, -3.69]$ and $x_2 \in [-5, -3]$

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

$$\frac{3x}{5x+7} - \frac{7x^2}{10x^2+49x+49} = \frac{7}{2x+7}$$

A. $x_1 \in [-2.14, -0.88]$ and $x_2 \in [-9, 0]$

B. $x \in [-2.14, -0.88]$

C. $x_1 \in [-4.08, -3.25]$ and $x_2 \in [-9, 0]$

D. $x \in [-7.6, -6.3]$

E. All solutions lead to invalid or complex values in the equation.

$$\frac{3x}{5x+7} - \frac{7x^2}{(5x+7)(2x+7)} = \frac{7}{2x+7}$$

DOMAIN:

$5x+7\neq 0$
$5x\neq -7$
$x\neq -\frac{7}{5}$

$2x+7\neq 0$
$2x\neq -7$
$x\neq -\frac{7}{2}$

★ DOMAIN IS ALL REAL NUMBERS EXCEPT $x=-\frac{7}{5}$ AND $x=-\frac{7}{2}$

32.

$$\left[-8 - \frac{3}{-2x-9} = \frac{8}{6(-2x-9)}\right] \quad (6(-2x-9))$$

LCD IS $6(-2x-9)$

$-8(6(-2x-9)) - 3(6) = 8$

$-48(-2x-9) - 18 = 8$

$96x + 432 - 18 = 8$

$96x + 414 = 8$

$-414 = -414$

$96x = -406$

$x = \frac{-406}{96}$

$\boxed{x = -4.23}$

★ IN THE DOMAIN!

DOMAIN:

$-2x - 9 \neq 0$

$-2x \neq 9$

$x \neq -\frac{9}{2}$

$x \neq -4.5$

$\Rightarrow$ DOMAIN IS ALL REAL NUMBERS EXCEPT $x = -4.5$

33.

$$\left[\frac{3x}{5x+7} - \frac{7x^2}{(5x+7)(2x+7)} = \frac{7}{2x+7}\right] \quad ((2x+7)(5x+7))$$

$3x(2x+7) - 7x^2 = 7(5x+7)$

$6x^2 + 21x - 7x^2 = 35x + 49$

$-x^2 + 21x = 35x + 49$

$0 = x^2 + 14x + 49$

$0 = (x+7)(x+7)$

$x + 7 = 0$

$\boxed{x = -7}$ ★ IN THE DOMAIN!

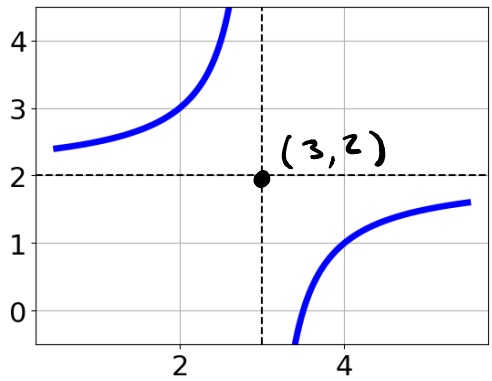
34. Choose the equation of the function graphed below.

★ PARENT FUNCTION IS $\frac{1}{x}$

★ $a < 0 \Rightarrow a = -1$

★ $(h,k) = (3,2)$

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



$f(x) = \frac{-1}{x-3} + 2$

A. $f(x) = \dfrac{-1}{(x+3)^2} + 2$

B. $f(x) = \dfrac{1}{x-3} + 2$

C. $f(x) = \dfrac{-1}{x - 3} + 2$

D. $f(x) = \dfrac{1}{(x+3)^2} + 2$

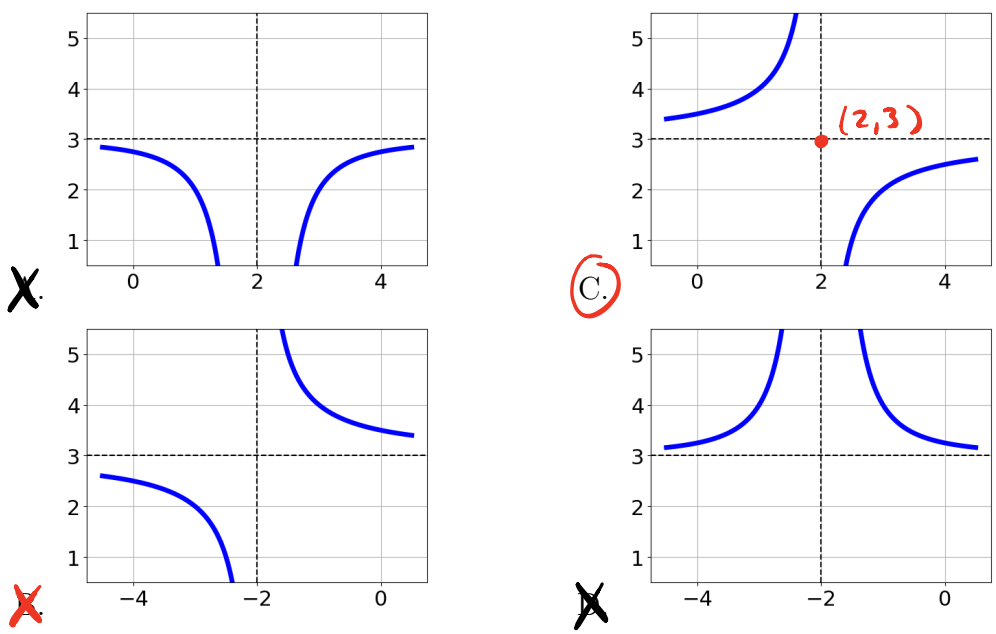
35. Choose the graph of the equation below.

★ PARENT FUNCTION IS $\frac{1}{x}$

★ $a = -1 \Rightarrow a < 0$

★ $(h,k) = (2,3)$

$$f(x) = \frac{-1}{x - 2} + 3$$



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

$$f(x) = \log_2(x-3) - 1$$

A. $(-\infty, a), a \in [-1.05, -0.47]$

B. $[a, \infty), a \in [2.22, 3.76]$

C. $(-\infty, a), a \in [0.3, 2.07]$

D. $(-\infty, a], a \in [-3.44, -2.66]$

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

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

---

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

$$f(x) = -e^{x-8} + 1$$

A. $(-\infty, a], a \in [0.6, 2.3]$

B. $[a, \infty), a \in [-3.4, 0.4]$

C. $(-\infty, a), a \in [0.6, 2.3]$

D. $(a, \infty), a \in [-3.4, 0.4]$

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

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

---

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

$$\log_5(-2x+5) + 6 = 2$$

$\log_5(-2x+5) = -4$

TO

A. $x \in [512, 517]$

B. $x \in [-1, 8]$

C. $x \in [507, 512]$

D. $x \in [-14, -9]$

E. There is no Real solution to the equation.

"5 TO THE −4 EQUALS −2x+5"

$5^{-4} = -2x + 5$

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

$\frac{1}{625} = -2x + 5$

$\frac{1}{625} - 5 = -2x$

$\frac{-4.9984}{-2} = \frac{-2x}{-2}$

$\boxed{2.4992 = x}$

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

$$15 = \ln\sqrt{\frac{26}{e^x}}$$

A. $x \in [-32, -20]$

B. $x \in [9, 18]$

C. $x \in [-15, -13]$

D. $x \in [20, 28]$

E. There is no solution to the equation.

$15 = \ln\left(\left(\frac{26}{e^x}\right)^{1/2}\right)$

$15 = \frac{1}{2}\left[\ln\left(\frac{26}{e^x}\right)\right]$

$15 = \frac{1}{2}\left[\ln(26) - \ln(e^x)\right]$

$15 = \frac{\ln(26)}{2} - \frac{x}{2}$

$\left[15 - \frac{\ln(26)}{2} = -\frac{x}{2}\right]2$

$30 - \ln(26) = -x$

$-30 + \ln(26) = x$

$-26.7 = x$

---

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

$$3^{5x-5} = \left(\frac{1}{16}\right)^{2x+2}$$

A. $x \in [2.8, 5.6]$

B. $x \in [-0.6, 0.8]$

C. $x \in [-6.4, -1.5]$

D. $x \in [0.3, 1.4]$

E. There is no Real solution to the equation.

$3^{5x-5} = \frac{1^{2x+2}}{16^{2x+2}} \Rightarrow 3^{5x-5} = \frac{1}{16^{2x+2}}$

$\ln(3^{5x-5}) = \ln\left(\frac{1}{16^{2x+2}}\right)$

$(5x-5)\ln(3) = \ln(1) - \ln(16^{2x+2})$

$5x\ln(3) - 5\ln(3) = 0 - [(2x+2)\ln(16)]$

$5x\ln(3) - 5\ln(3) = -(2x\ln(16) + 2\ln(16))$

$5x\ln(3) - 5\ln(3) = -2x\ln(16) - 2\ln(16)$

$+2x\ln(16) = +2x\ln(16)$

$5x\ln(3) + 2x\ln(16) - 5\ln(3) = -2\ln(16)$

$5x\ln(3) + 2x\ln(16) = -2\ln(16) + 5\ln(3)$

$x(5\ln(3) + 2\ln(16)) = -2\ln(16) + 5\ln(3)$

$x = \frac{-2\ln(16) + 5\ln(3)}{5\ln(3) + 2\ln(16)}$

$\boxed{x = -0.0047}$