

V.S. factor of 3  $\leftarrow$

$$y = 3 \log(x-2) + 1 \quad \leftarrow \text{sup } 1$$

$$x-2=0 \quad \leftarrow \text{right } 2$$

$$x =$$

$$0 = 3 \log(x-2) + 1$$

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

$$-\frac{1}{3} = \log_{10}(x-2)$$

$$10^{-1/3} = x-2$$

$$y = 10^{-1/3} + 2$$

Let  $y=0$

Set  $f(x)=0$

$$D: (2, \infty)$$

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

$$x\text{-inter} (10^{-1/3} + 2, 0)$$

$y\text{-inter} \rightarrow \text{None}$

$$\text{V.A. } x=2$$

End Behaviors

$$\lim_{x \rightarrow \infty} f(x) = \infty$$

$$x \rightarrow \infty$$

$$\lim_{x \rightarrow 2} f(x) = -\infty$$

$$x \rightarrow 2$$

(ONE)

V.A.  $\leftarrow$   
 by Factor 2  $y = 2 \log(x-1) - 2$   
 $\uparrow$  Right  $\downarrow$  Down 2

V.A.  $x-1=0$

$$0 = 2 \log(x-1) - 2$$

$$\frac{2}{2} = \frac{2 \log(x-1)}{2}$$

$$1 = \log(x-1)$$

$$10^1 = x-1$$

$$10 = x-1$$

$$x = 11$$

D:  $(1, \infty)$

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

V.A.  $x=1$

X-inter  $(11, 0)$

Y-inter None (DNE)

E.B.

$$\lim_{x \rightarrow \infty} f(x) = \infty$$

$$\lim_{x \rightarrow 1} f(x) = -\infty$$

Domain

8, 10, 12

Range

15, 18, 20

V.A.

X-inter

Y-inter

End Beh

$$8. g(x) = \log_5(2x + 9) - 2$$

$$\text{V.A. } 2x + 9 = 0$$

$$2x = -9$$

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

Y-inter

$$g(0) = \log_5(9) - 2$$

$$0 = \log_5(2x + 9) - 2$$

$$2 = \log_5(2x + 9)$$

$$5^2 = 2x + 9$$

$$25 = 2x + 9$$

$$16 = 2x$$

$$x = 8$$

$$D: \left(-\frac{9}{2}, \infty\right)$$

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

$$\text{V.A. } x = -\frac{9}{2}$$

$$\text{X-inter } (8, 0)$$

$$\text{Y-inter } \log_5(9) - 2$$

E.B.

$$\lim_{x \rightarrow \infty} f(x) = \infty$$

$$\lim_{x \rightarrow -\frac{9}{2}} f(x) = -\infty$$

10.  $f(x) = \log_2 (12 - 3x) - 3$       D:

R:

$$12. g(x) = \ln(3 - x)$$

$$= \ln(-x + 3)$$

$$(-(x-3))$$

$$3 - x = 0$$

$$3 = x$$

$$0 = \ln(3 - x)$$

$$e^0 = 3 - x$$

$$1 = 3 - x$$

$$-2 = -x$$

$$x = 2$$

$$D: (-\infty, 3)$$

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

$$V.A. x = 3$$

$$x\text{-inter } (2, 0)$$

$$y\text{-inter } (0, \ln 3)$$

E.B.

$$\lim_{x \rightarrow -\infty} f(x) = \infty$$

$$\lim_{x \rightarrow 3} f(x) = -\infty$$

$$\underline{15.} \quad g(x) = -\ln(3x + 9) - 7 \quad D: (-3, \infty)$$

$$3x + 9 = 0$$

$$3x = -9$$

$$x = -3$$

$$0 = -\ln(3x + 9) - 7$$

$$7 = -\ln(3x + 9)$$

$$-7 = \ln(3x + 9)$$

$$e^{-7} = 3x + 9$$

$$\frac{e^{-7} - 9}{3} = x$$

$$D: (-3, \infty)$$

$$V.A. \quad x = -3$$

$$x\text{-inter} \left( \frac{e^{-7} - 9}{3}, 0 \right)$$

$$y\text{-inter} \quad (0, -\ln(9) - 7)$$

E.B.

$$\lim_{x \rightarrow \infty} f(x) = -\infty$$

$$\lim_{x \rightarrow -3} f(x) = \infty$$

$$18. h(x) = -\log(3x - 4) + 3$$



$$20. f(x) = \log_3 (15 - 5x) + 6$$