Name Answer Key Date

Honors Algebra II – Practice with Graphing Rationals Period

Find the asymptotes of the function and sketch the graph.

1. $f(x)=\frac{x+1}{x-4}$

V.A → $x=4$
H.A. → $y=1$
y-int $(0,-1/4)$
x-int $(-1,0)$

2. $f(x)=\frac{x+6}{x^2-9}$

V.A → $x=3$ $x=-3$
H.A → $y=0$
y-int $(0,-2/3)$
x-int $(-6,0)$

3. $f(x)=\frac{x-3}{x^2+x-12}=\frac{x-3}{(x+4)(x-3)}$

V.A. → $x=-4$ HOLE@ $(3,1/7)$
H.A. → $y=0$
y-int $(0,1/4)$
x-int None (3 isn't in Domain)

4. $f(x)=\frac{x-4}{x^2-x-6}=\frac{x-4}{(x-3)(x+2)}$

V.A → $x=3$ $x=-2$
H.A → $y=0$
y-int $(0,2/3)$
x-int $(4,0)$

5. $f(x)=\frac{x^2-4x-21}{x^2-9}=\frac{(x-7)(x+3)}{(x-3)(x+3)}$

V.A. → $x=3$ HOLE@ $(-3,5/3)$
H.A. → $y=1$
y-int $(0,7/3)$
x-int $(7,0)$

6. $f(x)=\frac{1-x^2}{x^2-4x-5}=\frac{(1-x)(1+x)}{(x-5)(x+1)}$

V.A. → $x=5$ HOLE@ $(-1,1/3)$
H.A. → $y=-1$
y-int $(0,-1/5)$
x-int $(1,0)$

7. $f(x)=\frac{(2x-1)^2}{(1-3x)^2}$

V.A → $x=1/3$
H.A → $y=4/9$
y-int → $(0,1)$
x-int → $(1/2,0)$

8. $f(x)=\frac{4x+1}{6+x^2}$

V.A. → None
H.A. → $y=0$
y-int → $(0,1/6)$
x-int → $(-1/4,0)$

* 9. $f(x)=\frac{5+x}{2x^3+8x^2+x-2}$

Use calc to find domain restriction

V.A. → $x=-3.8$ $x\approx-.6$ $x\approx.4$
H.A. → $y=0$
y-int → $(0,-5/2)$
x-int → $(-5,0)$

10. $f(x)=\frac{2x^3-x^2-18x+9}{3x^3+3x^2-36x}=\frac{(x+3)(x-3)(2x-1)}{3x(x+4)(x-3)}$

V.A → $x=0$ $x=-4$ HOLE@ $(3,10/21)$
H.A. → $y=2/3$
y-int → None
x-int → $(-3,0)$ $(1/2,0)$

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

V.A. → $x=2$
H.A. → None
Slant → $y=x+5$
y-int $(0,2)$
x-int $(-4,0)(1,0)$

$$x-2\overline{)x^2+3x-4}\quad x+5+\frac{6}{x-2}$$
$$-(x^2-2x)$$
$$5x-4$$
$$-(5x-10)$$
$$6$$

12. $f(x)=\frac{2x^2+9x-5}{x+3}=\frac{(2x-1)(x+5)}{x+3}$

V.A. → $x=-3$
H.A. → None
Slant → $y=2x+3$
y-int $(0,-5/3)$
x-int $(1/2,0)(-5,0)$

$$x+3\overline{)2x^2+9x-5}\quad 2x+3$$
$$-(2x^2+6x)$$
$$3x-5$$
$$-(3x+9)$$
$$-14$$

13. $f(x)=\frac{5x^2-8x-4}{5x}=\frac{(5x+2)(x-2)}{5x}$

V.A → $x=0$
H.A. → None
Slant → $y=x-8/5$
y-int → None
x-int $(-2/5,0)(2,0)$

$$5x\overline{)5x^2-8x-4}\quad x-8/5$$
$$5x^2-8x-4$$

14. $f(x)=\frac{x^3-5x^2-4x+20}{x^2-1}=\frac{(x+2)(x-2)(x-5)}{(x+1)(x-1)}$

V.A. → $x=-1$ $x=1$
H.A. → None
Slant → $y=x-5$
y-int $(0,-20)$
x-int $(-2,0)(2,0)(5,0)$

$$x^2+0x-1\overline{)x^3-5x^2-4x+20}\quad x-5$$
$$-(x^3+0x^2-x)$$
$$-5x^2-3x+20$$
$$-(5x^2+0x+5)$$
$$-3x+15$$

15. $f(x)=\dfrac{x^3-9x^2+3x-12}{x^2-x-6}$

*use calc for x-int

V.A. → $x=3$ $x=-2$

H.A. → None

Slant → $y=x-8$

y-int $(0,2)$

x-int $(8.81,0)$

$x^2-x-6 \overline{)\, x^3-9x^2+3x-12}$ → $x-8$

$-(x^3-x^2-6x)$

$-8x^2+9x-12$

$-(-8x^2+8x+48)$

$x-60$

16. $f(x)=\dfrac{x^4-3x^3+x^2-4}{x^3+1}$ $=\dfrac{*\text{calc}}{(x+1)(x^2-x+1)}$

V.A. → $x=-1$

H.A. → None

Slant → $y=x-3$

y-int → $(0,-4)$

x-int → $(-.928,0)$ $(2.82,0)$

$x^3+0x^2+0x+1 \overline{)\, x^4-3x^3+x^2+0x-4}$ → $x-3$

$-(x^4+0x^3+0x^2-3x)$

$-3x^3+x^2-4x-4$

$-(-3x^3+0x^2-0x-3)$

-1

17. $f(x)=\dfrac{2x^4-4x^3+x-9}{1-x^4}$ $=\dfrac{*\text{calc}}{(1-x)(1+x)^2}$

V.A. → $x=1$ $x=-1$

H.A. → $y=-2$

y-int $=(0,-9)$

x-int $=(-1.17,0)$ $(2.28,0)$

18. $f(x)=\dfrac{x^4+3x^3-5x^2-4}{x^3-x^2}$ $=\dfrac{*\text{calc}}{x^2(x-1)}$

V.A. → $x=0$ $x=1$

H.A. → None

Slant → $y=x+4$

y-int → None

x-int → $(1.5,0)$ $(-4.23,0)$

$x^3-x^2 \overline{)\, x^4+3x^3-5}$ → $x+4$

$-(x^4-x^3)$

$4x^3-5x^2-4$

19. $f(x)=\dfrac{5x^4-x^2+3x-4}{x^3+2x^2}$ $=\dfrac{*\text{calc}}{x^2(x+2)}$

V.A. → $x=0$ $x=-2$

H.A. → None

Slant → $y=5x-10$

y-int → None

x-int → $(-1.15,0)$ $(.816,0)$

$x^3+2x^2 \overline{)\, 5x^4+0x^3-x^2+3x-4}$ → $5x-10$

$-(5x^4+10x^3)$

$-10x^3-x^2+3x-4$

$-10x^3$

20. $f(x)=\dfrac{3x^4+2x^3-5}{x^3-4x^2}$

*calc

V.A. → $x=0$ $x=4$

H.A. → None

Slant → $y=3x+14$

y-int → None

x-int → $(1,0)$ $(-1.35,0)$

$x^3-4x^2 \overline{)\, 3x^4+2x^3+0x^2-5}$ → $3x+14$

$-(3x^4-12x^3)$

$14x^3+0x^2-5$

$-(14x^3-56x^2)$

1	3	2	0	0	-5
		3	5	5	5
	3	5	5	5	10

$3x^3+5x^2+5x+5$