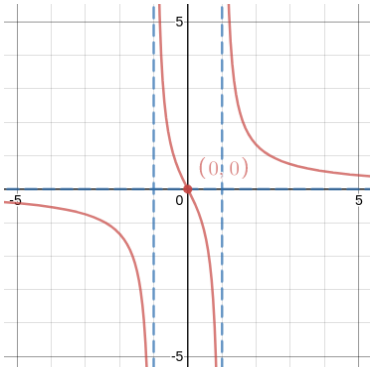
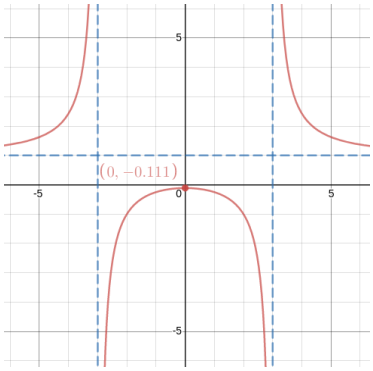
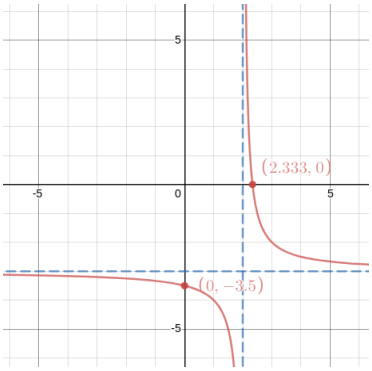
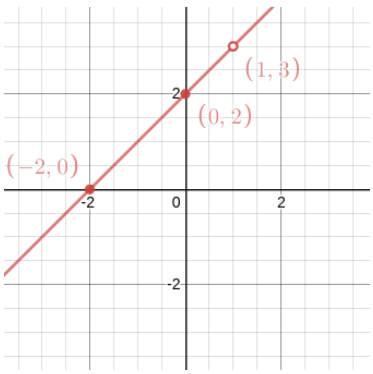
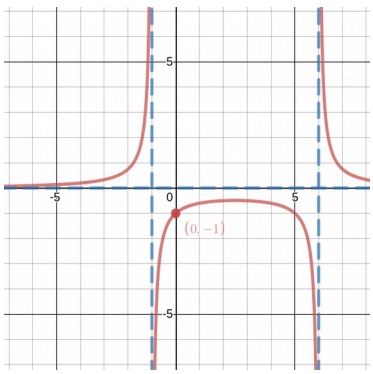
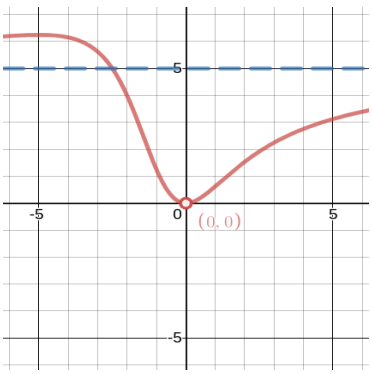
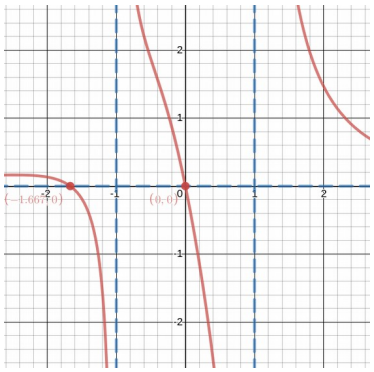
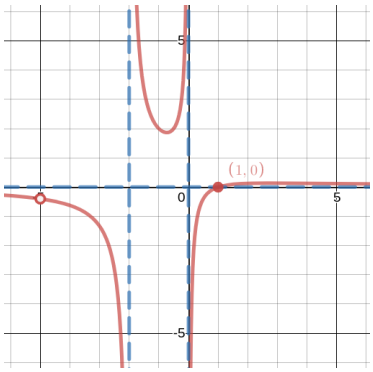
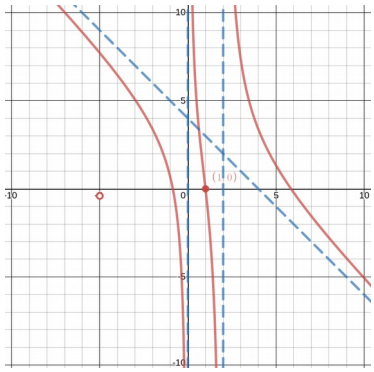
Rational Function Characteristics & Graphs – Answer Key

Find the listed characteristics for the following rational functions. Report answers as follows (you may also state 'none').

List intercepts as coordinate pairs. List asymptotes as equations. List holes by x value. Report domain by inequalities or set notation.

	1. $f(x)=\frac{2x}{x^2-1}$	**2. f(x) =** $\frac{x^2+1}{x^2-9}$	**3.** $f(x)=\frac{1}{x-2}-3$
domain	x ≠ -1, 1	x ≠ -3, 3	x ≠ 2
x-Intercept(s)	(0,0)	none	(7/3, 0)
y-Intercept(s)	(0,0)	(0,-1/9)	(0, -7/2)
vertical asymptote(s)	x = -1, x = 1	x = -3, x = 3	x = 2
horizontal asymptote(s)	y = 0	y = 1	y = -3
slant asymptote(s)	none	none	none
hole(s)	none	none	none
Graph			
	4. $f(x)=\frac{x^2+x-2}{x-1}$	**5.** $f(x)=\frac{6}{x^2-5x-6}$	**6.** $f(x)=\frac{5x^3}{x^3+2x^2+5x}$
domain	x ≠ 1	x ≠ -1,6	x ≠ 0
x-Intercept(s)	(-2, 0)	none	none
y-Intercept(s)	(0, 2)	(0, -1)	none
vertical asymptote(s)	none	x = -1, x = 3	none
horizontal asymptote(s)	none	y = 0	y = 5
slant asymptote(s)	y = x + 2	none	none
hole(s)	x = 1	none	x = 0
Graph			

	7. $f(x)=\frac{3x^2+5x}{x^4-1}$	**8.** $f(x)=\frac{x^2+4x-5}{x^3+7x^2+10x}$	**9.** $f(x)=\frac{-x^3+6x^2-5}{x^2-2x}$
domain	x ≠ -1, 1	x ≠ -5, -2, 0	x ≠ 0, 2
x-Intercept(s)	(0,0) , (-5/3, 0)	(1, 0)	$(1,0)$, $\left(\frac{5}{2}-\frac{3}{2}\sqrt{5},0\right)$, $\left(\frac{5}{2}+\frac{3}{2}\sqrt{5},0\right)$
y-Intercept(s)	(0,0)	none	none
vertical asymptote(s)	x = -1, x = 1	x = 0, x = -2	x = 0, x = 2
horizontal asymptote(s)	y = 0	y = 0	none
slant asymptote(s)	none	none	y = x + 4
hole(s)	none	x = -5	none
Graph			
	10. $f(x)=\frac{x^2+11x+18}{2x+1}$	**11.** $f(x)=\frac{-1}{x^3-6x^2+9x}$	**12. f** $(x)=\frac{x^2-2x-1}{x}$
domain	x ≠ -1/2	x ≠ 0, 3	x ≠ 0
x-Intercept(s)	(-9, 0) , (-2, 0)	none	$(1-\sqrt{2},0)$, $(1+\sqrt{2},0)$
y-Intercept(s)	(0,18)	none	none
vertical asymptote(s)	x = - 1/2	x = 0, x = 3	x = 0
horizontal asymptote(s)	none	y = 0	none
slant asymptote(s)	$y=\frac{1}{2}x+\frac{21}{4}$	none	y = x - 2
hole(s)	none	none	none
Graph