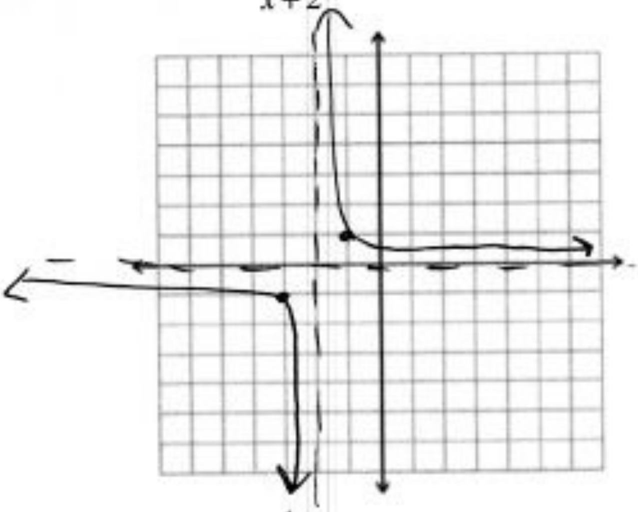
Secondary III
7-1 HW Rational Functions

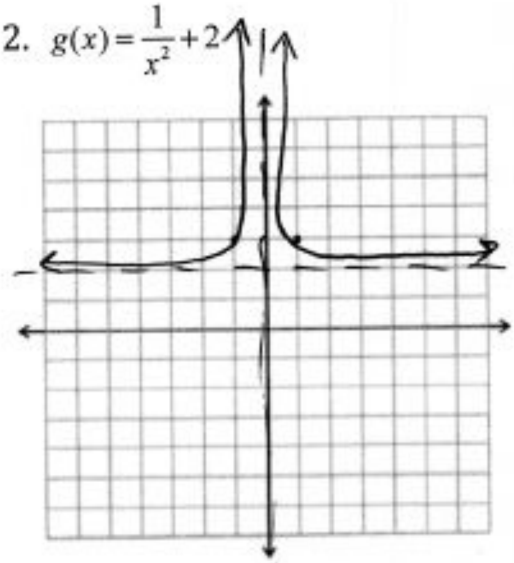
Name: Key
Period:________

Graph the Following functions:

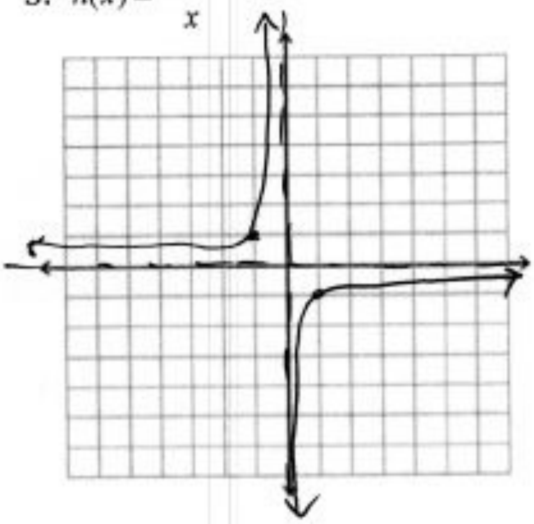
1. $f(x)=\frac{1}{x+2}$



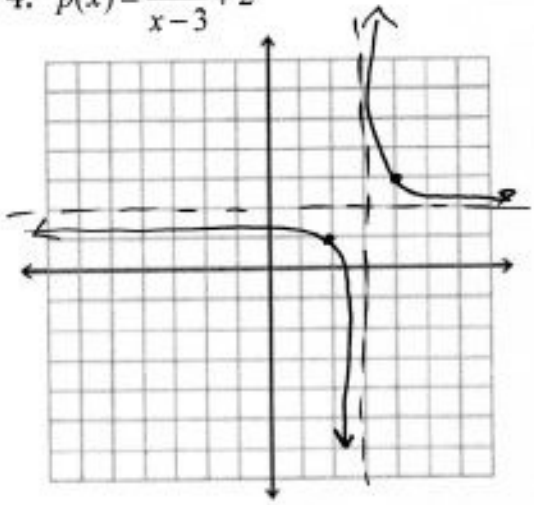
2. $g(x)=\frac{1}{x^2}+2$



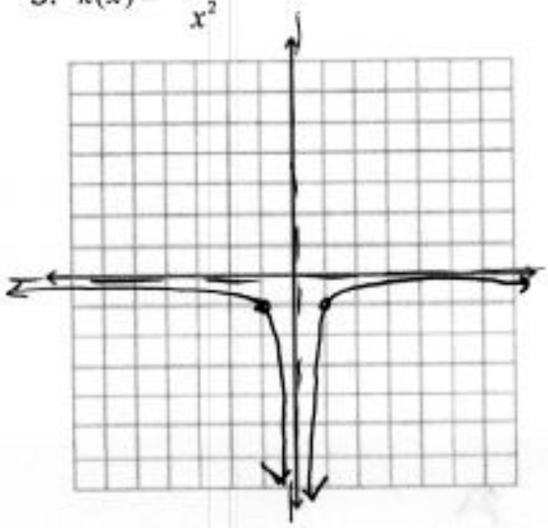
3. $h(x)=-\frac{1}{x}$



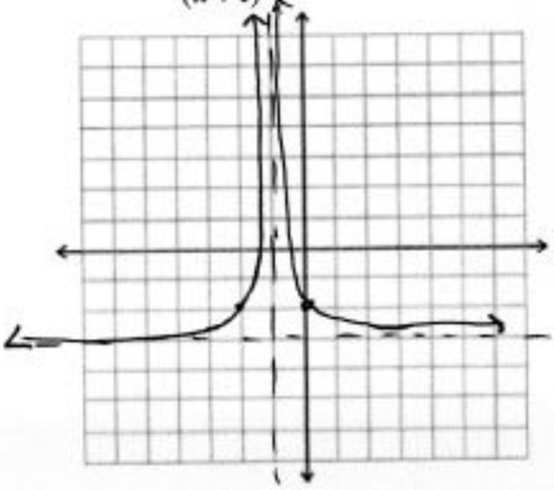
4. $p(x)=\frac{1}{x-3}+2$



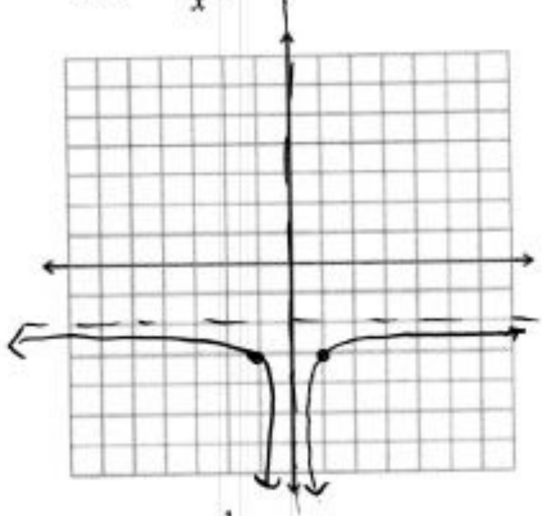
5. $k(x)=-\frac{1}{x^2}$



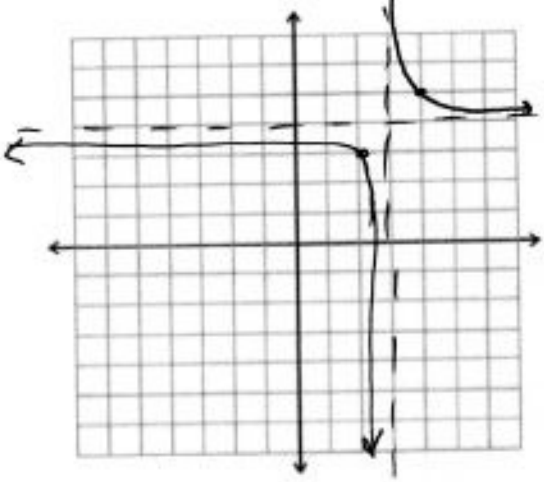
6. $f(x)=\frac{1}{(x+1)^2}-3$



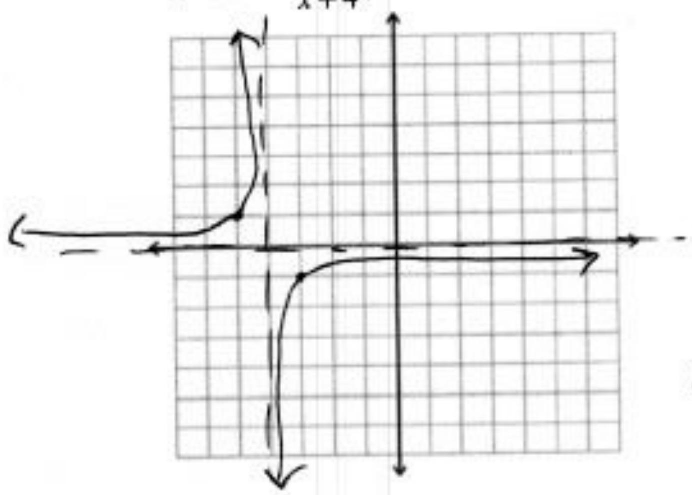
7. $f(x)=-\dfrac{1}{x^2}-2$



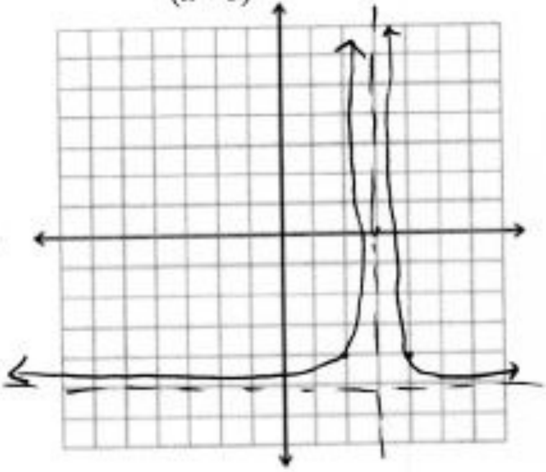
8. $p(x)=\dfrac{1}{x-3}+4$



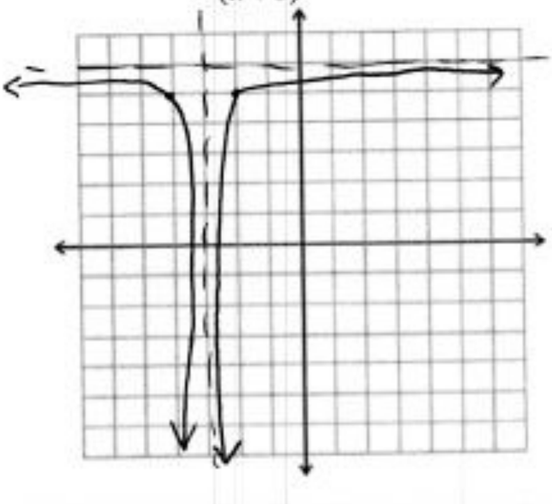
9. $f(x)=-\dfrac{1}{x+4}$



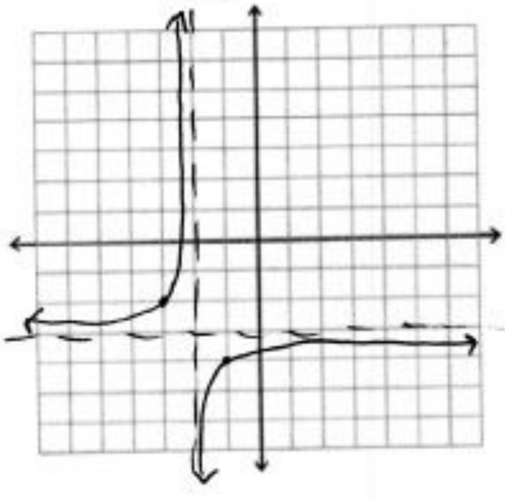
10. $g(x)=\dfrac{1}{(x-3)^2}-5$



11. $k(x)=-\dfrac{1}{(x+3)^2}+6$



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



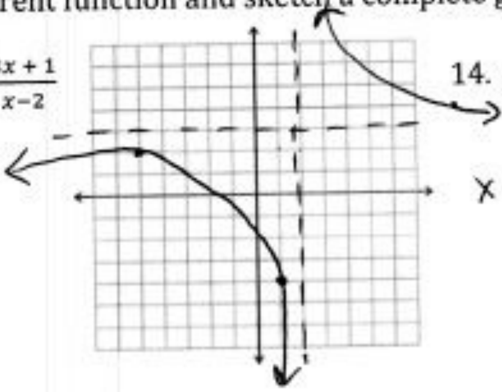
Rewrite the function in the form $f(x) = q(x) + \frac{r(x)}{d(x)}$, then write the transformations from its parent function and sketch a complete graph of f(x).

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

$3 + \frac{7}{x-2}$

$x-2 \overline{) 3x+1}$
$-(3x-6)$
7

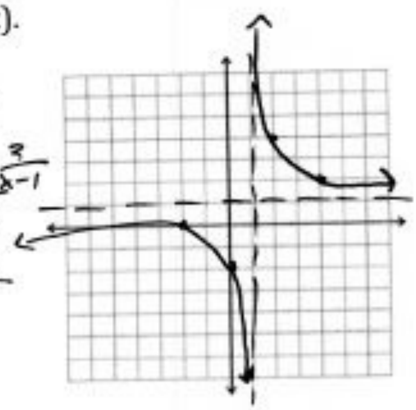
$f(x) = \frac{7}{x-2} + 3$



14. $g(x) = \frac{x+2}{x-1}$

$1 + \frac{3}{x-1}$

$x-1 \overline{) x+2}$
$-(x-1)$
3

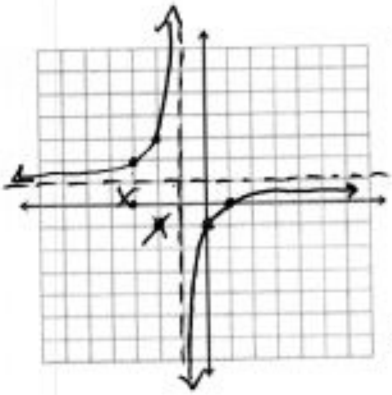


15. $h(x) = \frac{x-1}{x+1}$

$1 + \frac{-2}{x+1}$

$x+1 \overline{) x-1}$
$-(x+1)$
-2

$\frac{-2}{x+1} + 1$

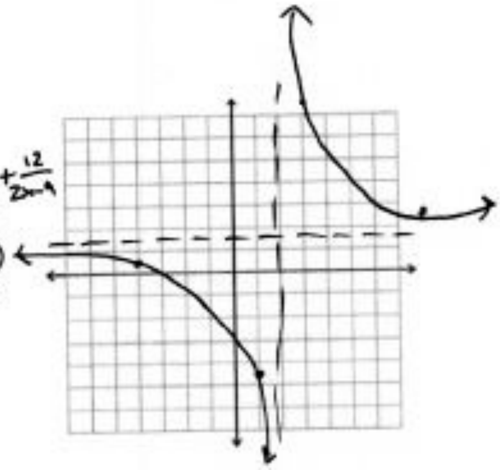


16. $j(x) = \frac{3x+6}{2x-4}$

$3/2 + \frac{12}{2x-4}$

$2x-4 \overline{) 3x+6}$
$-(3x-6)$
12

$\frac{\cancel{12}\,6}{\cancel{2}(x-2)} + \frac{3}{2}$



Give the function and analyze the following graphs:

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

Domain: $(-\infty, 4) \cup (4, \infty)$

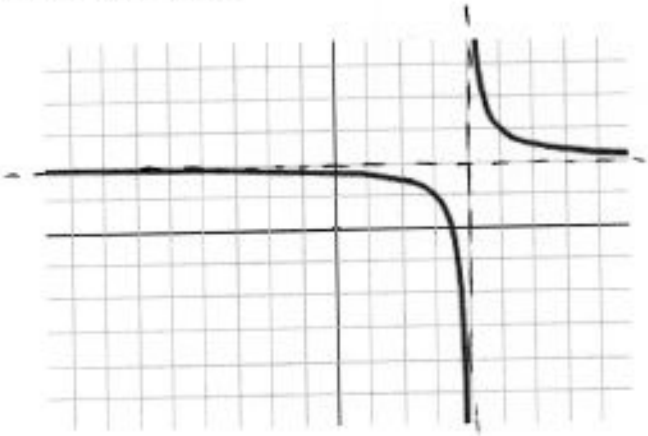
Range: $(-\infty, 2) \cup (2, \infty)$

V Asymptote: $x = 4$

H Asymptote: $y = 2$

increasing: n/a

decreasing: $(-\infty, 4) \cup (4, \infty)$



End Behavior:

$\lim_{x \to \pm\infty} f(x) = 2$

Asymptote behavior:

$\lim_{x \to 4^+} f(x) = \infty$

$\lim_{x \to 4^-} f(x) = -\infty$

18. g(x)= $\frac{1}{(x+2)^2} - 3$

Domain: $(-\infty,-2)\cup(-2,\infty)$

Range: $(-3,\infty)$

V Asymptote: $x=-2$

H Asymptote: $y=-3$

increasing: $(-\infty,-2)$

decreasing: $(-2,\infty)$

End Behavior:

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

Asymptote behavior:

$\lim_{x\to -2^+} f(x) = \infty$ $\lim_{x\to -2^-} f(x) = \infty$

19. h(x)= $\frac{1}{x} - 3$

Domain: $(-\infty,0)\cup(0,\infty)$

Range: $(-\infty,-3)\cup(-3,\infty)$

V Asymptote: $x=0$

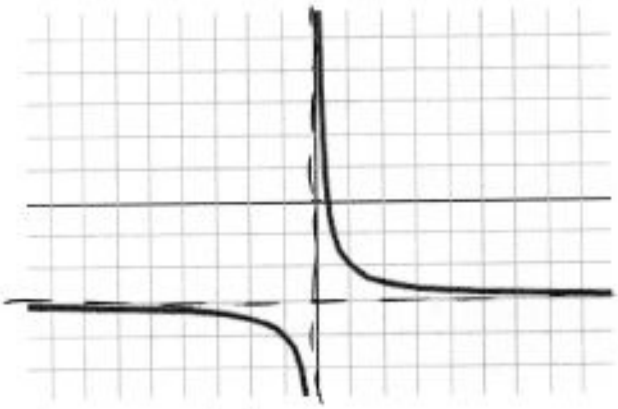
H Asymptote: $y=-3$

increasing: n/a

decreasing: $(-\infty,0)\cup(0,\infty)$

End Behavior:

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



Asymptote behavior:

$\lim_{x\to -3^+} f(x) = \infty$ $\lim_{x\to -3^-} f(x) = -\infty$

Review

Simplify the following rational expressions

1. $\frac{x^3-8}{2x^3}\cdot\frac{4x}{x^2-5x+6}$

$$\frac{\cancel{(x-2)}(x^2+2x+4)}{1\cancel{2}x^{\cancel{3}2}}\cdot\frac{\overset{2}{\cancel{4x}}}{\cancel{(x-2)}(x-3)}$$

$$\boxed{\frac{2(x^2+2x+4)}{x^2(x-3)}}$$

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

$$\frac{(x+6)\cancel{(x-2)}}{x(x+2)\cancel{(x-2)}}\cdot\frac{3(x-2)}{(x+2)(x-1)}$$

$$\boxed{\frac{3(x-2)(x+6)}{x(x+2)^2(x-1)}}$$