

Name: _____

Class: _____

Graphical Discontinuities HW (Lesson 2)**Comparing functions:**

Determine which function, $f(x)$ or $g(x)$, has a removable discontinuity without using your graphing calculator. Identify the removable discontinuity.

1. $f(x) = \frac{1}{x(x+6)}$

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

 $g(x)$

$x=0$

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

$g(x) = \frac{2}{x}$

 $f(x)$

$x=0$

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

$g(x) = (x-3)(x+7)$

 $f(x)$

$x=-2$

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

$g(x) = \frac{(x+4)(x+7)}{(x-2)(x-1)(x+7)}$

 $g(x)$

$x=-7$

Simplify each rational expression. List any restrictions on the domain.

6. $\frac{x^2-1}{x-1}$

$(x+1)$

$x \neq 1$

7. $\frac{x-5}{x^2-25}$

$\frac{1}{x+5}$

$x \neq 5$

8. $\frac{x^2+x-20}{x+5}$

$x-4$

$x \neq -5$

9. $\frac{x^2+5x-14}{x^2+8x+7}$

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

$x \neq -7, -1$

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Determine whether the graph of each rational function has a vertical asymptote, a removable discontinuity, and a root. List the vertical asymptote, discontinuities, and root - if any exist.

10. $f(x) = \frac{2x}{x-7}$

VA 7
RD None
RO

12. $f(x) = \frac{x-5}{10}$

VA None
RD None
RS

11. $f(x) = \frac{x-4}{(x-2)(x-4)}$

VA 2
RD None

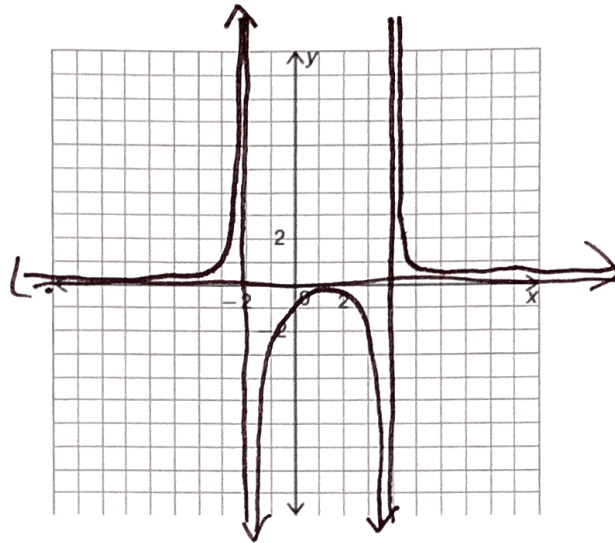
RD 4
13. $f(x) = \frac{x^2-3x}{x^2-9}$

VA -3
RD 3
RO

Sketch each function without using a graphing calculator. Indicate the domain, range, vertical and horizontal asymptote(s), and y-intercept.

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

Domain: $x \neq -2, 4$
Range: $(-\infty, -\frac{1}{4}] \cup (0, \infty)$
Vertical and Horizontal Asymptote(s):
 $x = -2, 4$ $y = 0$
y-intercept:
 $y = -\frac{1}{8}$



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

Domain: $x \neq 2, -3$
Range: $(-\infty, \frac{1}{25}] \cup (0, \infty)$
Vertical and Horizontal Asymptote(s):
 $x = 2, -3$ $y = 0$
y-intercept:
 $y = -\frac{1}{6}$

