LIMITS & CONTINUITY SORT and MATCH

THIS SORT & MATCH ACTIVITY IS MEANT FOR BEGINNING CALCULUS STUDENTS OR FOR END-OF-COURSE PRECALCULUS STUDENTS.

ACTIVITY OVERVIEW:

Match the 8 function cards to the corresponding equation card, limit card, and description card. Then, answer the set of questions based on your matching.

USING THE ACTIVITY:

- Copy, cut, and laminate sets of cards prior to use.
- Students work in groups of 2-4.
- No graphing calculator or computer is allowed.
- Students work cooperatively to complete the matching portion on the recording sheet.
- Answer the questions about the set of cards.

NOTE: The limit and description cards may apply to more than one of the functions. However, there is only one correct match so that each set is complete with 4 cards.

ANSWER KEY:

GRAPH	EQUATION	LIMITS	DESCRIPTION
G1	E7	L2	D4
G2	E5	L1	D3
G3	E6	L8	D7
G4	E8	L5	D6
G5	E1	L4	D2
G6	E4	L7	D1
G7	E3	L6	D8
G8	E2	L3	D5

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G1

G2

G3

G4

G5

G6

G7

G8

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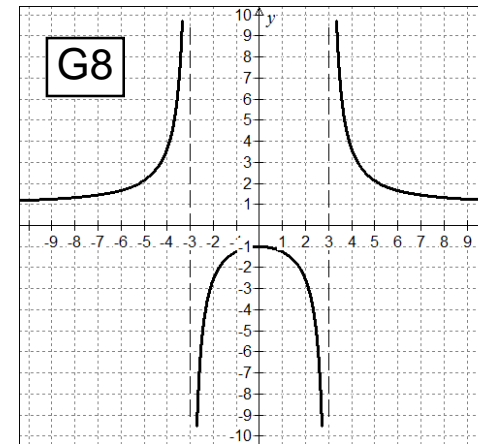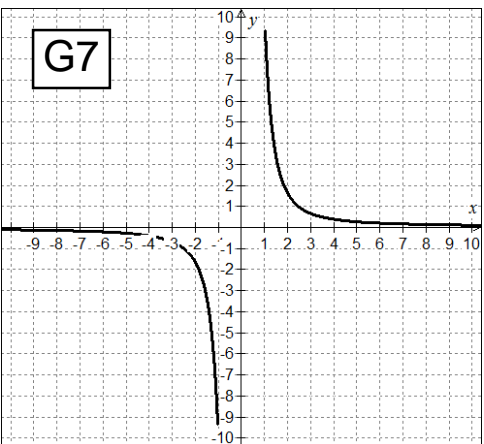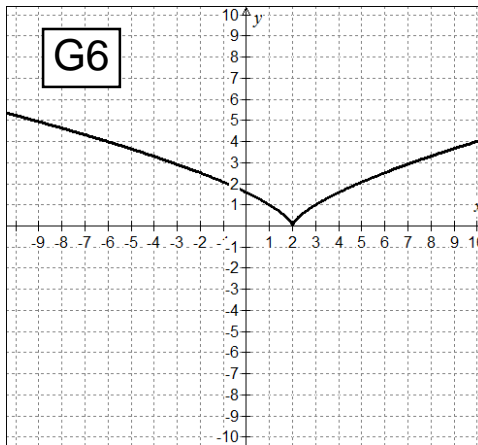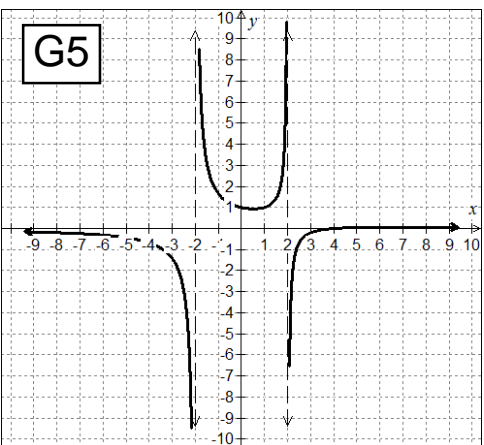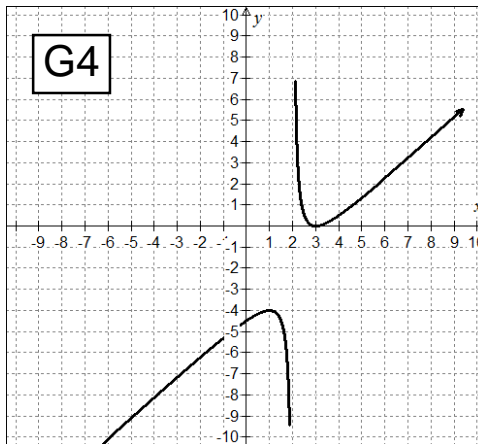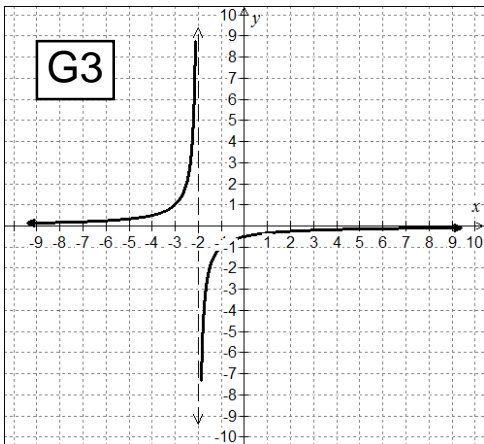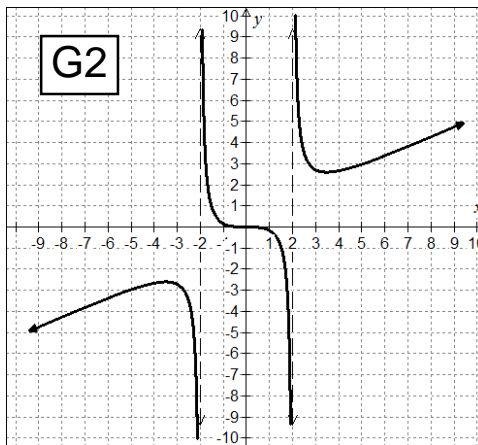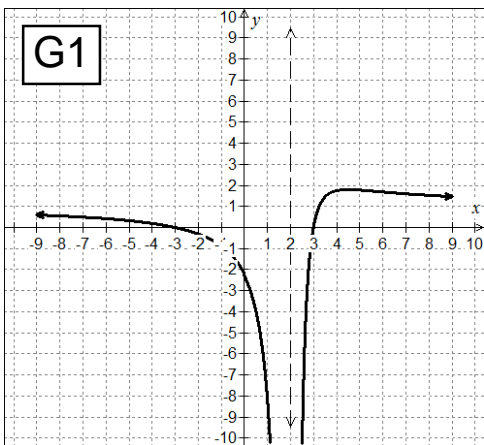
E1

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

E2

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

E3

$$f(x) = \frac{x^2 + 9}{x^3}$$

E4

$$f(x) = \sqrt[3]{(x - 2)^2}$$

E5

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

E6

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

E7

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

E8

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

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L1 $$\lim_{x \to 2} f(x) = DNE$$ $$\lim_{x \to -2} f(x) = DNE$$	**L2** $$\lim_{x \to +\infty} f(x) = 1$$ $$\lim_{x \to -\infty} f(x) = 1$$
L3 $$\lim_{x \to -3^-} f(x) = +\infty \qquad \lim_{x \to -3^+} f(x) = -\infty$$ $$\lim_{x \to 3^-} f(x) = -\infty \qquad \lim_{x \to 3^+} f(x) = +\infty$$	**L4** $$\lim_{x \to +\infty} f(x) = 0$$ $$\lim_{x \to -2^+} f(x) = +\infty$$
L5 $$\lim_{x \to 2^-} f(x) = -\infty$$ $$\lim_{x \to 2^+} f(x) = +\infty$$	**L6** $$\lim_{x \to 0^-} f(x) = -\infty$$ $$\lim_{x \to 0^+} f(x) = +\infty$$
L7 $$\lim_{x \to 2} f(x) = 0$$	**L8** $$\lim_{x \to +\infty} f(x) = 0$$ $$\lim_{x \to -2} f(x) = DNE$$

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D1

This function has symmetry with respect to $x = 2$. It is continuous on $(-\infty, \infty)$. The range of the function is $[0, \infty)$.

D2

This function has three asymptotes and a y-intercept at $\left(0, \frac{3}{4}\right)$.

D3

This function has no horizontal asymptotes. The oblique asymptote is $y = \frac{1}{2}x$.

D4

This function is concave down on $(-\infty, 2)$ and $(2, \infty)$.

D5

This function has a horizontal asymptote at $y = 1$ and the y-intercept is $(0, -1)$.

D6

This function is concave down on $(-\infty, 2)$ and concave up on $(2, \infty)$.

D7

This function has a point discontinuity at $\left(2, -\frac{1}{4}\right)$ and a y-intercept at $\left(0, -\frac{1}{2}\right)$.

D8

For every (x, y) of the graph of $f(x)$, $(-x, -y)$ is on the graph. This function has an infinite discontinuity at $x = 0$.

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LIMITS & CONTINUITY SORT and MATCH ACTIVITY

GROUP MEMBER NAMES: _____

Period: _____ Date: _____ Score: _____

Complete the sort and match activity in your assigned group. Record your findings on the table below by listing the CARD NUMBER. Then, complete the LAB SHEET.

GRAPH	EQUATION	LIMITS	DESCRIPTION
G1			
G2			
G3			
G4			
G5			
G6			
G7			
G8			

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LIMITS & CONTINUITY SORT and MATCH LAB SHEET

Names: _____

Use the completed set of cards to answer the question(s) below.

1. For the graph labeled G1, state the domain and range of the function.
    [Note: $x = 4.5$ is the location for absolute maximum.]

2. For the graph labeled G2, use interval notation to write the x-values where $f(x)$ is continuous.

3. For the graph labeled G3, state all asymptotes.

4. For the graph labeled G4, find

    a. $\lim\limits_{x \to 1} f(x) =$

    b. $\lim\limits_{x \to 3} f(x) =$

5. For the graph labeled G5, is the function even, odd, or neither. Explain how you know.

6. For the graph labeled G6,

    a. Find $\lim\limits_{x \to 3} f(x) =$

    b. Find the y-intercept.

7. For the graph labeled G7, state all asymptotes.

8. For the graph labeled G8, use the following terms (increasing, decreasing, stalled, fast, slow) to explain

    a. The instantaneous rate of change of the function at $x = -4$

    b. The instantaneous rate of change of the function at $x = 0$.

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