Pre-Calculus 12 Enriched
Radical & Rational Functions Extension

1a.) On the same graph, sketch the graphs of $f(x) = \frac{1}{1-x}$ and $g(x) = \frac{1}{x-1}$.

b.) Let ε be any positive real number. Determine the values of the following.

i. $f(1+\varepsilon)$
ii. $f(1-\varepsilon)$
iii. $g(1+\varepsilon)$
iv. $g(1-\varepsilon)$

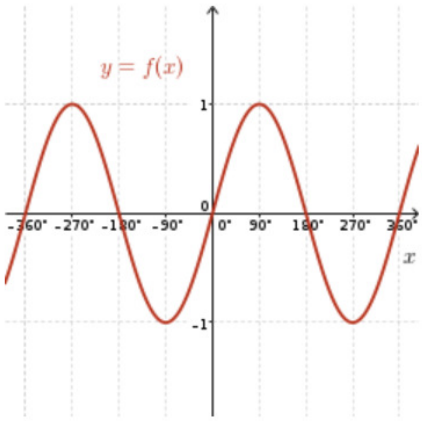
c.) Sketch the graph of $h(x) = f(x) + g(x)$. Determine the value of $h(1+\varepsilon)$ and $h(1-\varepsilon)$ for any value of $\varepsilon > 0$.

2.) If $\frac{(x-2013)(y-2014)}{(x-2013)^2+(y-2014)^2} = \frac{1}{2}$, determine the value of $x + y$.

3a.) Determine the *x*-intercepts, *y*-intercepts, and all asymptotes for the function, $f(x) = \frac{x+4}{2x-5}$.

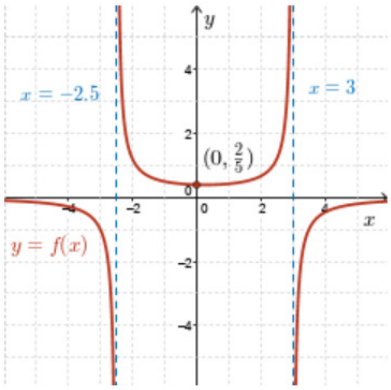
b.) Determine all values of *x* such that $f(x) = \frac{x+4}{2x-5} \geq 0$.

4.) Given the graph of $y = f(x)$, sketch the graph of $y = \frac{1}{f(x)}$.



5.) Determine the equation of the vertical, horizontal, and/or oblique asymptotes for each function. Identify any holes, if they exist. $f(x) = \frac{x^2-4}{x-1}$

6.) Given the graph of the reciprocal function $y = \frac{1}{f(x)}$, sketch the graph the function $y = f(x)$. Determine an equation for each function.



7.) Students in a local physics class are investigating Ohms law which relates the voltage, *V*, in an electrical circuit, measured in volts, to the electric current, *I*, measured in amperes, and the resistance, *R*, measured in ohms, by the equation $V = IR$. An electrical circuit is created by connecting a 9volt battery to a variable resistor which allows the resistance to vary between 0 and 50 ohms.

a.) Determine a function to represent the current, I, passing through the circuit as a function of the resistance, r.

b.) What is an appropriate domain for this situation? Sketch a graph of the function.

c.) Students then insert a light bulb, with a resistance of 10 ohms, in series with the circuit to see how the variable resistor affects the brightness of the light bulb. How does the function determined in part (a) change? Recall that the total resistance in a series circuit is the sum of the resistance of all of the resistors in the circuit.

8a.) In mathematics, two positive numbers are in a golden ratio if the ratio of the larger number to the smaller number is equal to the ratio of their sum to the larger number. If 5 and *n* are in a golden ratio, where $n > 5$, determine the exact value of *n*.

b.) Two positive numbers are in the silver ratio if the ratio of the larger number to the smaller number is equal to the ratio of the sum of the smaller number plus twice the larger number to the larger number. If 5 and *n* are in a silver ratio, where $n > 5$, find the exact value of *n*.