**Math: Unit 5 Review**

**Part One**

Things to know about in dealing with reciprocal functions (not dealing with concepts based upon horizontal asymptotes, oblique asymptotes and holes): the y values prevalent within the points of the reciprocal function are the reciprocal y values of the original said function; it is also important to note that the graph of the reciprocal function has a vertical asymptote at each zero of the original function; it must also be noted that a reciprocal function has the same positive/negative intervals as the original function (simply meaning that wherever the original function lies relative to the x-axis, so too does the reciprocal function); it is also important to note that the intervals of increase on the original function are intervals of decrease on the reciprocal function and vice versa; it must also be noted that if the range of the original function includes 1 and/or -1, the reciprocal function will intersect the original function at a point where its y value is either 1 or -1; the only real thing left to note in dealing with reciprocal functions is to note that where there is a local maximum point on the original function, there is a said local minimum point on the reciprocal function and vice versa

**Part Two**

Rational function: a rational function is a function (that is very much like that of the reciprocal function) that can be expressed as the division of two polynomial functions (mathematically speaking, the general equation used to showcase a rational function is stated as followed: f(x) = p(x) / q(x) where p(x) and q(x) are polynomials and q(x) ≠ 0)Key concepts to know about in dealing with rational functions (finally touching upon the concepts of the horizontal asymptote in accordance with the oblique asymptote): a rational function can have a horizontal asymptote only when the highest degree of the numerator is less than (the horizontal asymptote in this given instance is just y = 0) or equal to (the horizontal asymptote in this given situation can be calculated using the concept of limits: the horizontal asymptote’s equation is stated as followed: y = limx🡪∞ f(x) = limx🡪∞ p(x) / q(x) (where in this given equation the numerator and denominator are divided by the highest degree’s associated variable x in accordance with the said degree in the means of calculating what the given horizontal asymptote is)) (the horizontal asymptote in this given situation can be calculated using the concept of limits: the horizontal asymptote’s equation is stated as followed: y = limx🡪∞ f(x) = limx🡪∞ p(x) / q(x) (where in this given equation the numerator and denominator are divided by the highest degree’s associated variable x in accordance with the said degree in the means of calculating what the given horizontal asymptote is)) the degree of the denominator and that a rational function can have an oblique asymptote if the highest degree of the numerator is one greater than that of the highest degree found in the denominator (the oblique asymptote in this given situation can be calculated by using long division in the means of finding the quotient of the given division situation (this is done so because the equation of the oblique asymptote is merely the quotient of the division situation of the given two polynomials p(x) and q(x) in f(x))) and that a rational function has neither a horizontal or oblique asymptote if and only when the numerator’s degree is two or more greater in value than that of the denominator’s degree; it is also important to note that a rational function has a hole if there is a common factor that can be canceled out in both the numerator and denominator (where this said hole resides is at x = a where the given factor being cancelled out in both the numerator and denominator is of the form x - a)

**Part Three**

Process of sketching a graph for any given reciprocal or rational function: the first thing to do is to state the equation of the function; after doing this, one should then state the vertical asymptotes (the behaviour of the function should be stated to the left and right of all said vertical asymptotes by formulating a table of some sort), horizontal asymptotes, oblique asymptotes and holes (if there are none of the already stated things, explicitly state that there are no said things); after doing this, state the said function’s x and y intercepts; graph the said function based upon the already formulated graph information; after doing this, conclusively just state the intervals of increase and decrease and the domain and range

**Part Four**

Solving a rational function: the concept of solving a said rational function is very much so likewise to the premise behind finding the x-intercepts of the said rational function (it just must be well noted that in dealing with the solution set of a said rational function, restrictions must be stated upon the variable x before starting the process of solving such that the function is not undefined in value)

Process of solving an inequality dealing with rational functions: one would treat it much so in the same manner as solving a typical polynomial function (firstly, one would state restrictions upon the variable x such that the function does not become undefined; after doing this, one would collect like terms (by finding the lowest common denominator between terms and simplifying) on one side of the said inequality letting the other side being equated to 0 and then one would notably factor both the numerator and denominator of the said rational function; lastly, one would then graph the said solution upon that of a number line and look to see where the graph lies relative to the number line axis from interval to interval; if necessary, one would then after doing this state the said interval notation solution and the set notation solution)