Pop Quiz 2

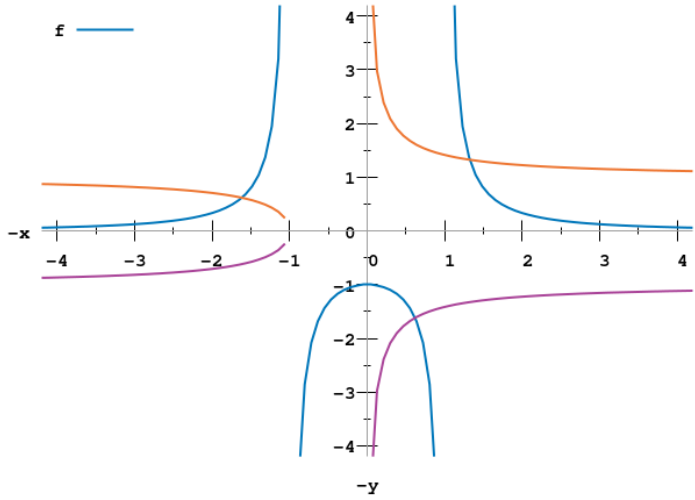
Precalculus: Functions, Geometry, Trigonometry, & Modelling
UCR Math-005-E01, Summer 2020

1. Let the function f be defined by the rule $f(x) = \frac{1}{x^2-1}$. Graph this function. What is the largest subset of the real numbers that we could declare to be the domain of this function? Does f have a unique inverse f^{-1}? If it does, what is it? If it does not, find *an* inverse for f and tell me the largest subset of the range of f that we can make a domain of your f^{-1}.

   We must exclude the real numbers 1 and -1 from the domain of f. Because f is not one-to-one (note that $f(x) = f(-x)$) the function cannot have a unique inverse. Instead it could have two different inverse functions

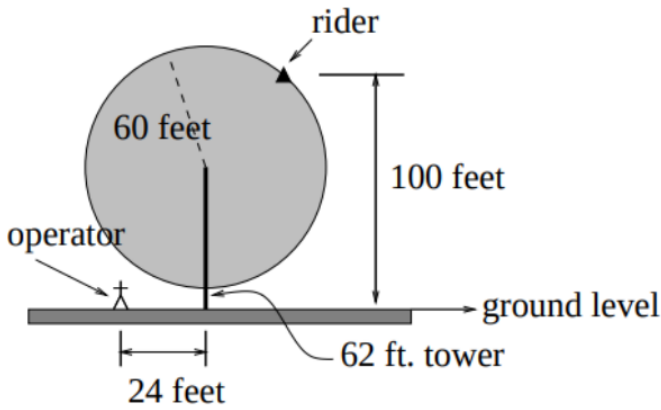
   $$f^{-1}(x) = \sqrt{\frac{1}{x}+1} \quad \text{or} \quad f^{-1}(x) = -\sqrt{\frac{1}{x}+1}$$

   drawn in orange and violet in this graph.



Since we cannot take the square root of a negative number, and since we cannot divide by zero, the domain of either of these inverses will have to exclude the interval $(-1,0]$, so the largest connected subset of the range of f that will be the domain of f^{-1} will be the union of the intervals $(-\infty,1]$ and $(0,\infty)$.

2. (UW) An amusement park Ferris Wheel has a radius of 60 ft. The center of the wheel is mounted on a tower 62 ft above the ground. The wheel is not currently turning.



(a) Suppose a rider is located at a point in the picture, 100 ft above the ground. If the rider drops an icecream cone straight down, where will it land on the ground?

(b) The ride operator is standing 24 ft to one side of the support tower on the level ground. Determine the possible height(s) the rider on the Ferris wheel would have to be so that a dropped icecream cone lands on the operator.

This was covered thoroughly in discussion. The icecream cone lands about $46\frac{1}{2}$ ft to the right of the base of the tower, and for the icecream cone to land on the operator the rider could be either 117 ft or 7 ft off the ground.