

Math 1513 - College Algebra

Quiz #18 - 2018.10.26

Solutions

Construct a *possible* rational function $r(x)$ whose graph is given below.

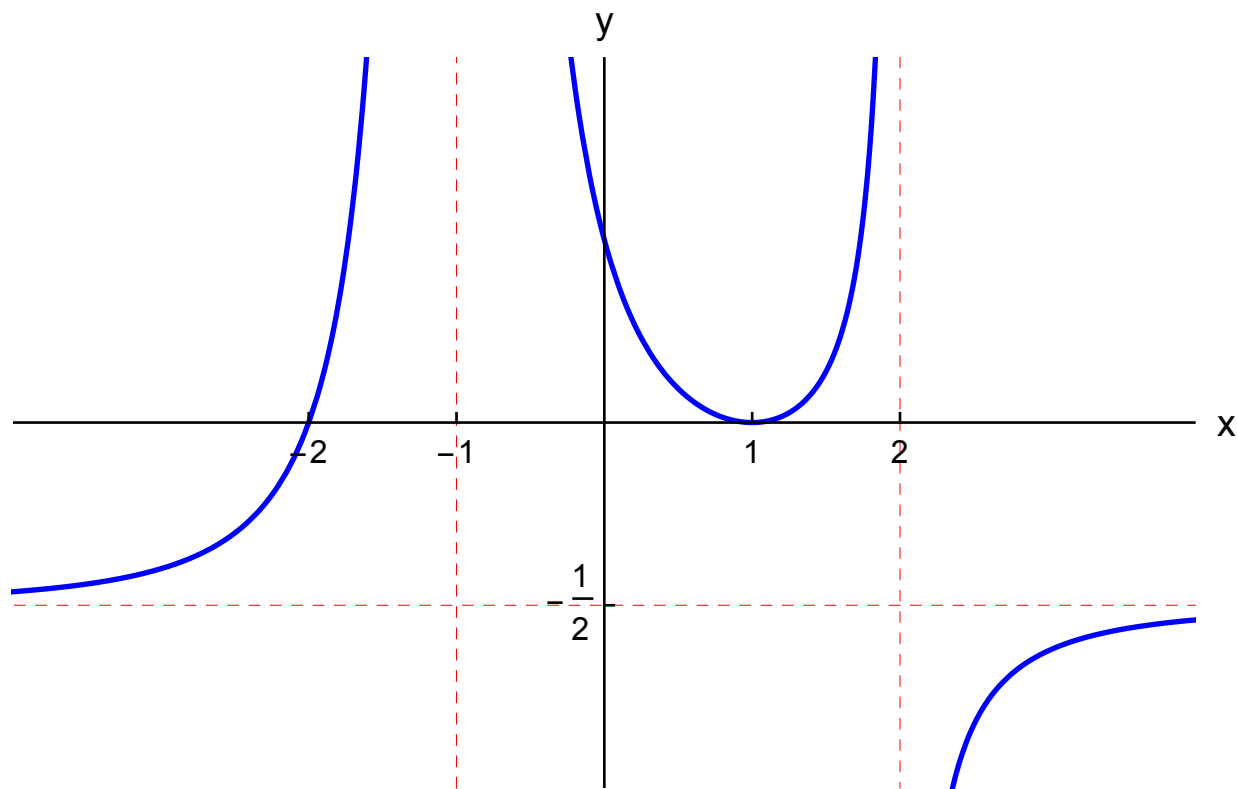


FIGURE 1. Graph of an unknown rational function $r(x)$.

There are two roots, one at $x = -2$ of multiplicity 1, and one at $x = 1$ of even multiplicity (say perhaps 2). There are two vertical asymptotes: $x = -1$, and $x = 2$, where the asymptote at $x = 2$ has even degree, the other odd. So far, we could guess that $r(x)$ might have the following form:

$$r(x) = \frac{(x-1)^2(x+2)}{(x+1)^2(x-2)}$$

In this case, however, it appears that the horizontal asymptote is at $y = -\frac{1}{2}$, which means that the degree of the numerator must be the degree of the denominator, and the ratio of the leading coefficients should be $-\frac{1}{2}$. Thus, we should now consider

$$r(x) = -\frac{1}{2} \frac{(x-1)^2(x+2)}{(x+1)^2(x-2)}$$

And just to check, we see that $r(0) = \frac{1}{2} > 0$, so it appears that our final form above works!