University of Utah
Math 1090, Fall 2009
Name: Key.

Quiz #4
Time: 10 minutes

Show all work. Check your answers.

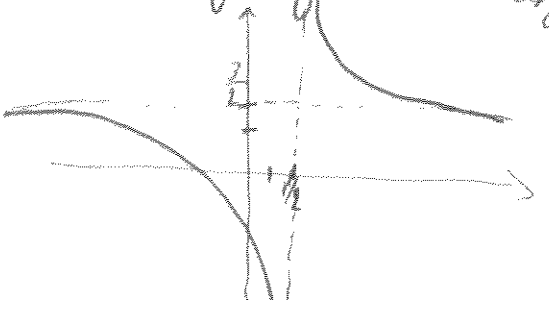
Consider the function $f(x) = \frac{x+1}{2x-3}$, and denote Γ its graph. (a) Find the domain of f and the vertical asymptotes of Γ. (b) Find the horizontal asymptotes of Γ. (c) Determine the position of Γ relative to its asymptotes (for horizontal ones: above/below, for vertical ones: does the graph go up or down to the left/right of the asymptote?) (d) Sketch the graph Γ.

(a) Domain: all reals except $\frac{3}{2}$ (where denominator is 0).
Since numerator is not 0 at $x = \frac{3}{2}$, Γ has a vertical asymptote ($x = \frac{3}{2}$).

(b) For the horizontal asymptote, look at highest-degree terms: $\frac{x}{2x} = \frac{1}{2}$
so Γ has a horizontal asymptote ($y = \frac{1}{2}$).

(c) * When x is very large (and positive) $x+1 > \frac{1}{2}(2x-3) = x - \frac{3}{2}$
so $f(x) > \frac{1}{2}$: Γ is above ($y = \frac{1}{2}$)
* When x is very large (and negative), still: $x+1 > \frac{1}{2}(2x-3)$
but now $2x-3 < 0$ so divide inequality by negative number to get:
$f(x) < \frac{1}{2}$ (and Γ is below $y = \frac{1}{2}$).
* When x is slightly larger than $\frac{3}{2}$,
$2x-3$ is a (small) positive number
and $x+1$ is also positive: so $f(x) > 0$ to the right of vertical asymptote ("graph shoots up")
* When x is slightly smaller than $\frac{3}{2}$,
$2x-3$ is a (small) negative number, and $x+1$ is still positive
so $f(x) < 0$ to the left of vertical asymptote ("graph shoots down").

(d)



(If you care, Γ is a hyperbola)