#s 1-11 Find all asymptotes and intercepts. Then sketch the graph.

1. $f(x)=\frac{1}{x}$
2. $f(x)=\frac{1}{x-2}$
3. $f(x)=\frac{1}{x-4}$
4. $f(x)=-\frac{1}{(x+4)^2}$
5. $f(x)=\frac{x-3}{x+2}$
6. $f(x)=\frac{2x+1}{x-1}$
7. $f(x)=\frac{x}{x^2-1}$
8. $f(x)=\frac{4x}{x^2-2x+1}$
9. $f(x)=\frac{8-x^2}{x^2-9}$
10. $f(x)=\frac{2x^2+8x+2}{x^2+2x+1}$
11. $f(x)=\frac{x^2+1}{x}$

#s 12 – 21 Solve the rational inequalities.

12. $w>\frac{w-5}{w+3}$
13. $\frac{x-4}{x+2}\le 0$ Handling the $\le$ is subtle, because x = - 2 is not allowed; whereas, x = 4 is allowed.
14. $\frac{q-2}{q+3}<2$
15. $\frac{w^2-w-6}{w-6}\ge 0$
16. $\frac{1}{x+2}>\frac{1}{x-3}$
17. $x<\frac{3x-8}{5-x}$
18. $\frac{(x-3)(x+1)}{x-5}\ge 0$

These take us all the way back to how I showed you how to solve rational equations. If you cross-multiply these inequalities, you're doing it wrong. You *must* find the common denominator, get everything on one side, combine into one fraction, and compare to zero.

The '$5-x$' in the denominator can make the sign pattern a little tricky. Make sure you *know* your end behavior.

19. $\frac{x^2-7}{2-x^2} \geq 0$ I learned to think of x^2-7 as $x^2-\left(\sqrt{7}\right)^2$ and factor as the difference of two squares, but you can *always* resort to quadratic formula to factor *any* quadratic expression. Funny/sad thing, to *me*, is the number of students who can work quadratic equations and quadratic formula, but who stop when the same skills are placed in a different context. It's all the same. Free your mind. Back up and see the forest. There's less going on, here, than newbies think. But you won't see that until you practice, practice and practice some more.

20. $\frac{x^2+2x+1}{x^2-2x-15} \geq 0$

21. $\frac{1}{w} > \frac{1}{w^2}$