1.5 Limits approaching infinity (VA's)

33) $\lim_{x\to -1^+} \frac{1}{x+1} = \frac{1}{-1+1} = \frac{1}{0}$ ← vertical asymptote at $x=-1$

*test decimals $x=-0.9$ $\quad \frac{1}{-0.9+1} = \frac{+}{+} = \boxed{+\infty}$

35) $\lim_{x\to 2^+} \frac{x}{x-2} = \frac{2}{0}$ V.A. at $x=2$ $\quad$ test decimal $x=2.1$ $\quad \frac{2.1}{2.1-2} = \frac{+}{+} = \boxed{+\infty}$

37) $\lim_{x\to -3^-} \frac{x+3}{x^2+x-6} = \frac{0}{0} = \lim_{x\to -3^-} \frac{x+3}{(x+3)(x-2)} = \lim_{x\to -3^-} \frac{1}{x-2} = \frac{1}{-3-2} = \boxed{-\frac{1}{5}}$

39) $\lim_{x\to 0^-} \left(1+\frac{1}{x}\right) = \lim_{x\to 0^-} \frac{x}{x} + \frac{1}{x} = \lim_{x\to 0^-} \frac{x+1}{x} = \frac{1}{0}$ V.A. at $x=0$ $\quad$ test $x=-0.1$

$= \frac{-0.1+1}{-0.1} = \frac{+}{-} = \boxed{-\infty}$

41) $\lim_{x\to -4^-} x^2 + \frac{2}{x+4}$ V.A. at $x=-4$ $\quad$ *test $x=-4.1$ $\quad \frac{2}{-4.1+4} = \frac{+}{-} = \boxed{-\infty}$

49) $\lim_{x\to 1^+} \frac{x^2+x+1}{x^3-1} = \lim_{x\to 1^+} \frac{x^2+x+1}{(x-1)(x^2+x+1)} \lim_{x\to 1^+} \frac{1}{x-1}$ V.A. at $x=1$ $\quad$ * test $x=1.1$

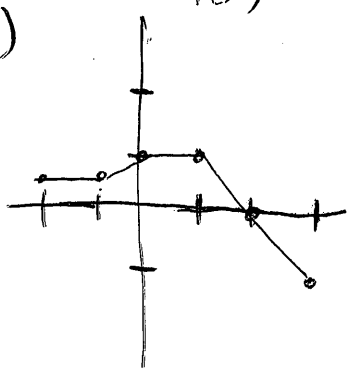
$\frac{1}{1.1-1} = \frac{+}{+} = \boxed{+\infty}$

55) VA: $x=6$, $x=-2$ $\quad$ zero at $x=3$

$$\boxed{f(x) = \frac{(x-3)}{(x-6)(x+2)} = \frac{x-3}{x^2-4x-12}}$$

1.5

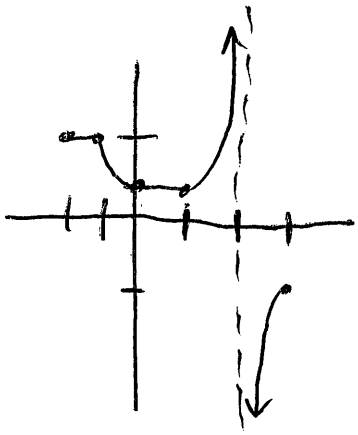
57) $f(x)$



Sketch $g(x) = \frac{1}{f(x)}$

$f(x)$	
x	y
-2	$1/2$
-1	$1/2$
0	1
1	1
2	0
3	-1

$g(x)$	
x	y
-2	2
-1	2
0	1
1	1
1.9	$+\infty$
2	und.
2.1	$-\infty$
3	-1



65) False, not all rational functions have vertical asymptotes.

66) True, polynomial functions have no vertical asymptotes