Finally, we are interested also in problems of the type: $\lim_{x\to\pm\infty} f(x)$. Here are the rules:

Write $f(x)$ as a fraction. 1) If the highest power of x appears in the denominator (bottom heavy), $\lim_{x\to\pm\infty} f(x) = 0$

2) If the highest power of x appears in the numerator (top heavy), $\lim_{x\to\pm\infty} f(x) = \pm\infty$

plug in very large or small numbers and determine the sign of the answer

3) If the highest power of x appears both in the numerator and denominator (powers equal), $\lim_{x\to\pm\infty} f(x) = \frac{\text{coefficient of numerator's highest power}}{\text{coefficient of denominator's highest power}}$

$\frac{3x^3}{4x}$ $\frac{3x^2}{}$ $= +\infty$

Example 12) $\lim_{x\to\infty} \frac{4x^2+50}{x^3-85} = 0$ H.A. $y=0$

Example 13) $\lim_{x\to\infty} \frac{4x^3-5x^2+3x-1}{5x^3-7x-25} = \frac{4}{5}$ $= \frac{1}{1}$

Example 14) $\lim_{x\to\infty} \frac{3x^3-23}{4x-1}$ no H.A.

Example 15) $\lim_{x\to-\infty} \frac{4x-5x^2+3}{\frac{1}{x}}$ $+\infty$ $-x^3$ no H.A. $-x^2 \cdot x$

Example 16) $\lim_{x\to\infty} \frac{\sqrt{x^2}-3x}{2x+1}$ $\frac{x^1}{2x+1}$ x^{-1} $\frac{-x^2}{\frac{1}{x}}$ H.A. $y=\frac{1}{2}$

Example 17) $\lim_{x\to-\infty} \frac{\sqrt{x^2-3x}}{2x+1} = -\frac{1}{2}$ H.A $y=-\frac{1}{2}$