**Summary 5: Special Limits**

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| **To find limits at infinity** you can try the following shortcut:$$\lim\_{x\to \pm \infty } \frac{p\left(x\right)}{q\left(x\right)}=\left\{\begin{matrix}\frac{a\_{n}}{b\_{n}} if deg(top) = deg(bottom)\\ 0 if deg(top) < deg(bottom)\\\pm \infty if deg(top) > deg(bottom)\end{matrix}\right.$$**Squeezing Theorem:** If $h\left(x\right)\leq f\left(x\right)\leq g\left(x\right)$ and $\lim\_{x\to a}h\left(x\right)=L$ as well as $\lim\_{x\to a}g\left(x\right)=L$ then $\lim\_{x\to a}f\left(x\right)=L$**Special limits:** $\lim\_{x\to 0}\frac{\sin(\left(x\right))}{x}=1$ $\lim\_{x\to 0}\frac{cos\left(x\right)-1}{x}=0$ $\lim\_{x\to a}\frac{\sin(\left(3x\right))}{x}=3$ $\lim\_{x\to a}\frac{\sin(\left(4x\right))}{\sin(\left(5x\right))}=\frac{4}{5}$ | **Examples**:  |