Consider the sequence $\left\{\dfrac{5k^2-42}{3k^2+5}\right\}_{k=1}^{\infty}$. We want to know whether or not this sequence converges, and if so, what to.

Just to try to get a feel for what's going on with this sequence, let's look at the first several terms of this sequence.

k	a_k
1	$-\frac{37}{8}$
2	$-\frac{22}{17}$
3	$\frac{3}{32}$
4	$\frac{38}{53}$
5	$\frac{83}{80}$
6	$\frac{138}{113}$

Thus the sequence begins like

$$\{-\frac{37}{8}, -\frac{22}{17}, \frac{3}{32}, \frac{38}{53}, \frac{83}{80}, \frac{138}{113}, \ldots\}$$