From Wikipedia: "Although implicit in the development of calculus of the 17th and 18th centuries (Newton published his *Principia Mathematica* in 1687), the modern idea of the limit of a function goes back to Bolzano who, in 1817, introduced the basics of the ϵ-δ technique to define continuous functions. However, his work was not known during his lifetime. Cauchy discussed limits in his *Cours d'analyse* (1821) and gave essentially the modern definition, but this is not often recognized because he only gave a verbal definition. Weierstrass first introduced the ϵ-δ definition of limit in the form it is usually written today. He also introduced the notations lim and $\lim_{x \to x_0}$. The modern notation of placing the arrow below lim is due to Hardy in *A Course of Pure Mathematics* in 1908."

Problem 1. *How many years did it take for mathematicians to come up with the Limit Laws as we see them? How many mathematicians did it take?*

Problem 2. *Write down the 11 Limit Laws. Which of the rules allow us to "plug the point in"?*

Problem 3. *Compute the limit, showing **all** work and stating which Limit Law you used (think of the expression as a single piece that you can only change using the Limit Laws):*
$$\lim_{x \to -1} \sqrt[5]{\frac{2x + 3}{x^2}}$$

Problem 4. *Compute the following limits, showing some work. Discuss which laws or theorems you are using.*

(a) $\lim_{x\to 3}(5x^3 - 3x^2 + x - 6)$

(b) $\lim_{x\to -2}\sqrt{u^4 + 3u + 6}$

(c) $\lim_{x\to 3}(2x + |x - 3|)$

(d) $\lim_{x\to -2}\dfrac{x + 2}{x^3 + 8}$

(e) $\lim_{x\to 4}\dfrac{x^2 - 4x}{x^2 - 3x - 4}$

(f) $\lim_{x\to 0}\sqrt{x^3 + x^2}\sin(\pi/x)$

(g) $\lim_{x\to 1} g(x)$*, if you know that* $2x \le g(x) \le x^4 - x^2 + 2$ *for all* x*.*

(h) $\lim_{x\to 1} h(x)$*, if you know that* $2x \le h(x) \le x^4 - x^2 + 2$ *for all* $x > 1$*.*