Extra Credit #2

Math 195-1XD

July 1, 2016

$$\sqrt{1+1} = 1.41421356...$$

$$\sqrt{1+\sqrt{1+1}} = 1.55377397...$$

$$\sqrt{1+\sqrt{1+\sqrt{1+1}}} = 1.59805318...$$

$$\sqrt{1+\sqrt{1+\sqrt{1+\sqrt{1+1}}}} = 1.61184775...$$

$$\sqrt{1+\sqrt{1+\sqrt{1+\sqrt{1+\sqrt{1+1}}}}} = 1.61612120...$$

If we continue adding more and more radicals in this way to the expression on the left, the computations on the right get closer and closer to a particular number, called the *limit*.

Question: What is the limit?

$$\sqrt{1+\sqrt{1+\sqrt{1+\ldots}}} = ?$$

And why?

Hint:

$$\text{If } f(x) = x$$

$$\text{then } f(f(x)) = f(x) = x,$$

$$\text{and so on.}$$