

November 16<sup>th</sup>

$$\sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \dots}}}}$$

$$\text{Let } x = \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \dots}}}}$$

Now realise that the section highlighted must be equal to  $x$

$$\sqrt{2 + \boxed{\sqrt{2 + \sqrt{2 + \sqrt{2 + \dots}}}}} \quad \leftarrow x$$

Leading to

$$x = \sqrt{2 + x}$$

Hence

$$x^2 = 2 + x \quad \text{so} \quad x^2 - x - 2 = 0$$

Solving this gives

$$\mathbf{x = 2}$$