Enough Precision?

Calculate

$$\sqrt{0.\underbrace{111\ldots111}_{100\ times}}$$

(a) to 100 significant digits;
(b) to 101 significant digits;
(c) to 200 significant digits.

Answer of problem **Enough Precision?**

Use the fact that

$$\frac{1}{9} = 0.(1)$$

and write

$$0.\underbrace{111\ldots1}_{100\ times} = \frac{1}{9}(1 - 10^{-100})$$

So the square root of that will be approximately

$$\frac{1}{3}\left(1 - \frac{1}{2}10^{-100} - \frac{1}{8}10^{-200}\right) = 0.(3) - 0.1(6) * 10^{-100} - 0.041(6) * 10^{-200}$$

$$\boxed{= 0.\underbrace{33\ldots33}_{100\ times}1\underbrace{66\ldots6}_{100\ times}\ldots}$$