

Challenge Problem 12: Four 4s

It's possible to write the numbers 1 through 10 using exactly three 3's along with mathematical operations such as $+$, $-$, \div , \cdot , $\sqrt{}$, $!$, and decimals. For example

- $1 = 3^{3-3}$
- $2 = 3 - \frac{3}{3}$
- $3 = 3 + 3 - 3$
- $4 = 3 + \frac{3}{3}$
- $5 = 3! - \frac{3}{3}$
- $6 = 3! - 3 + 3$
- $7 = 3! + \frac{3}{3}$
- $8 = \left(\frac{3!}{3}\right)^3$
- $9 = 3 + 3 + 3$
- $10 = \frac{\sqrt{3} \cdot \sqrt{3}}{.3}$

Write each of the numbers using 1 through 10 using exactly four 4's.