

The sum to infinity of a geometric series is 27.
The sum of the first 3 terms is 19.
Find the common ratio.

$$\frac{U_1}{1-r} = 27$$

$$S_n = \frac{U_1(1-r^n)}{1-r}$$

$$\frac{U_1(1-r^3)}{1-r} = 19$$

$$\frac{U_1(1-r^3)}{1-r} = 19$$

$$\frac{U_1}{1-r}(1-r^3) = 19$$

$$27(1-r^3) = 19$$

$$1-r^3 = \frac{19}{27}$$

$$1 - \frac{19}{27} = r^3$$

$$r^3 = \frac{8}{27}$$

$$r = \sqrt[3]{\frac{8}{27}}$$

$$r = \frac{\sqrt[3]{8}}{\sqrt[3]{27}}$$

$$r = \frac{2}{3}$$

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We need to solve these simultaneous equations.
Notice that $\frac{U_1}{1-r}$ is common to both equations