

Quiz 14, October 18, 2016

Find the sum of the series

$$\left(\frac{-2}{5}\right)^2 + \left(\frac{-2}{5}\right)^3 + \left(\frac{-2}{5}\right)^4 + \left(\frac{-2}{5}\right)^5 + \left(\frac{-2}{5}\right)^6 + \dots$$

This is the geometric series with initial term $a = \left(\frac{-2}{5}\right)^2$ and ratio $r = \left(\frac{-2}{5}\right)$. We notice that $-1 < r < 1$; so, the series converges to

$$\frac{a}{1-r} = \frac{\left(\frac{-2}{5}\right)^2}{1 - \left(\frac{-2}{5}\right)} = \frac{4}{25 + 10} = \boxed{\frac{4}{35}}.$$