



$$1 = \frac{10 - 1}{9}, 11 = \frac{10^2 - 1}{9}, \dots, \frac{10^n - 1}{9}$$
$$\rightarrow S = \frac{1}{9} (10 + 10^2 + 10^3 + \dots + 10^n - n)$$
$$= \frac{1}{9} \left(\frac{10(10^n - 1)}{9} - n \right)$$