Sample Solution

1. Find the sum of the series $\sum_{k=1}^{\infty}(-\frac{119}{120})^k$.

$$\sum_{k=1}^{\infty}\left(-\frac{119}{120}\right)^k = \sum_{k=0}^{\infty}\left(\frac{-119}{120}\right)^{k+1} = \left(\frac{-119}{120}\right)\sum_{k=0}^{\infty}\left(\frac{-119}{120}\right)^k$$

$$= \frac{-119}{120} \cdot \frac{1}{1-\left(\frac{-119}{120}\right)} = \frac{-119}{239}$$

$|r| = \left|\frac{-119}{120}\right| < 1$
So, geometric series is convergent

OR

$$\sum_{k=1}^{\infty}\left(\frac{-119}{120}\right)^k = -1 + 1 + \sum_{k=1}^{\infty}\left(\frac{-119}{120}\right)^k = -1 + \sum_{k=0}^{\infty}\left(\frac{-119}{120}\right)^k$$

$$= -1 + \frac{1}{1-\left(\frac{-119}{120}\right)} = -\frac{119}{239}$$

$|r| = \left|\frac{-119}{120}\right| < 1$
So, geometric series is convergent.