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For  $k \geq 0$ ,

$$\frac{6^k + k}{k! + 6} < \frac{6^k + k}{k!} < \frac{6^k + 6^k}{k!} = \frac{2 \cdot 6^k}{k!} < \frac{6 \cdot 6^k}{k!} = \frac{6^{k+1}}{k!}.$$

$$\text{So } \frac{6^k + k}{k! + 6} < \frac{6^{k+1}}{k!}.$$

Thus since  $\sum_{k=0}^{\infty} \frac{6^{k+1}}{k!}$  converges (#17),

$\sum_{k=0}^{\infty} \frac{6^k + k}{k! + 6}$  must converge by the Comparison Test.