Problem 1. Does the following sum converge?

$$\sum_{k=1}^{\infty}\left(\frac{k}{2k+10}\right)^{k}$$

Problem 2. Does $\displaystyle\sum_{n=1}^{\infty}\frac{2^n n!}{n^n}$ converge?

Hint: You may find it helpful that

$$\lim_{n\to\infty}\left(1-\frac{1}{n+1}\right)^{n}=e^{-1}.$$