Discuss convergence or divergence of the series whose nth term is

1. $(-1)^{n}\frac{n^{n}}{(n+1)^{n+1}}$ (b) $(-1)^{n}\frac{(n+1)^{n}}{n^{n}}$

(c) $\frac{n^{n}}{(n+1)^{n+1}}$ (d) $\frac{(n+1)^{n}}{n^{n+1}}$

Given that $\sum\_{}^{}a\_{n} $is a convergent series of real numbers, Prove either $\sum\_{}^{}b\_{n}$. Is convergent or give a counter example, when we define $b\_{n} $ by

1. $\frac{a\_{n}}{n}$
2. $\frac{n^{1/n}}{a\_{n}}$
3. $a\_{n}\sin(n)$
4. $\frac{a\_{n}}{(1+\left|a\_{n}\right|)}$
5. $\frac{\sqrt{a\_{n}}}{n}$ where $a\_{n}\geq 0$
6. $\sqrt{\frac{a\_{n}}{n}}$ where $a\_{n}\geq 0$