

inequality anyone?

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Need help with proving this inequality (to do with proving that a power-series is analytic):

$$\left| \frac{z^{k+1} - b^{k+1}}{z-b} - (k+1)b^k \right|$$

$$\leq \frac{(|b| + |z-b|)^{k+1} - |b|^{k+1}}{|z-b|} - (k+1)|b|^k$$

$$\leq (k+1)[(|b| + |z-b|)^k - |b|^k]$$

I start with $|z| \leq |b| + |z-b|$, and get the first term of the second line.

But why subtract the term $(k+1)|b|^k$? Wouldn't you add for a triangle inequality?

And, how do you go from the 2nd line to the 3rd line?

The 3rd line can be re-written:

$$(k+1)[(|b| + |z-b|)^k - |b|^k] = k(|b| + |z-b|)^k + (|b| + |z-b|)^k - (k+1)|b|^k$$

The 2nd and 3rd term on the r.h.s can easily be gotten, but I am having trouble getting $k(|b| + |z-b|)^k$.

Thanks!

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