Dear Haedeh Gooransarab,

In what concerns your first question I use the following:

$$\mathrm{diamComp} f^{-1}(A) \le \mathrm{Const}\nu |f'(z)|^{-1} \mathrm{diam} A \qquad (*)$$

for every $z \in \mathrm{Comp} f^{-1}(A)$ and every set A.

This is a very fundamental, but very simple lemma. In the simplest case just let $f(x) \approx x^\nu$ and $A = [0, a]$ Then $\mathrm{diam} f^{-1}(A) \approx a^{1/\nu}$ and $|f'(z)|^{-1} \ge \mathrm{Const}(1/\nu) a^{1/\nu - 1}$ for $f(z) \in [0, a]$ and we conclude (*).

You can find it in my new preprint "Iterations of holomorphic Collet-Eckmann ... " , Lemma 1.3 (I will mail it to you by standard mail in a while). However this lemma appears in many papers on iterations since a long time.

In what concerns your second question maybe I should have written the appropriate paragraph more detaily as follows:

We used here only the fact that $n - k$ is arbitrarily large, an appropriate exponent is guaranteed by (2). So in the case A contains periodic orbits and the whole orbit $x, ... f^n(x)$ except for a bounded number of last points is close to one of these periodic orbits, say γ, then γ is that periodic orbit we look for.

Best regards, Feliks Przytycki