1125-37-317 **Hiroki Sumi*** (sumi@math.sci.osaka-u.ac.jp), Department of Mathematics, Graduate School of, Science, Osaka University, 1-1, Machikaneyama, Toyonaka, Osaka 5600043, Japan. *Finding Roots of Any Polynomials by Random Relaxed Newton's Methods.* Preliminary report.

We develop the theory of random complex dynamical systems and apply the results to finding roots of any complex polynomials by random relaxed Newton's methods. More precisely, for any complex polynomial f, let $N_{f,\lambda}(z) = z - \lambda \frac{f(z)}{f'(z)}$, where z is a point in the Riemann sphere and $\lambda \in \{\mathbb{C} \mid |\lambda - 1| < r\}$ ($\frac{1}{2} < r < 1$), and we consider the random dynamical system on the Riemann sphere such that at every step we choose $\lambda \in \{\lambda \in \mathbb{C} \mid |\lambda - 1| < r\}$ according to the uniform distribution, and map the point under $N_{f,\lambda}$. We show that for any polynomial f, for any initial value z in the complex plane which is not a root of f', the random orbit starting with z tends to a root of f almost surely, which is **the virtue of the effect of randomness**. In fact, such a statement **cannot hold in the deterministic relaxed Newton's method** and any other deterministic complex analytic iterative schemes to find roots of polynomials. Thus the above result deals with a **randomness-induced phenomenon**. For the preprint, see https://arxiv.org/abs/1608.05230. (Received August 26, 2016)