设r是 https://gss3.bdstatic.com/-Po3dSag_xI4khGkpoWK1HF6hhy/baike/s%3D59/sign=5082ab3058afa40f38c6ced4aa6459d9/eaf81a4c510fd9f9f458496b272dd42a2834a460.jpg 的根，选取 https://gss2.bdstatic.com/-fo3dSag_xI4khGkpoWK1HF6hhy/baike/s%3D15/sign=802826810d2442a7aa0ef9a0d04342de/6a63f6246b600c33993dc2ca184c510fd9f9a16f.jpg 作为r的初始近似值，过点 https://gss1.bdstatic.com/9vo3dSag_xI4khGkpoWK1HF6hhy/baike/s%3D71/sign=f2cbaa33a38b87d65442a91e0608b5bb/ac345982b2b7d0a24d231c9fc9ef76094a369acd.jpg 做曲线https://gss3.bdstatic.com/7Po3dSag_xI4khGkpoWK1HF6hhy/baike/s%3D59/sign=a638fa186259252da7171d0d359bf9a9/810a19d8bc3eb1354c3bafb9a41ea8d3fd1f4437.jpg 的切线L，L的方程为 https://gss0.bdstatic.com/94o3dSag_xI4khGkpoWK1HF6hhy/baike/s%3D180/sign=bb2a367e530fd9f9a4175161152cd42b/00e93901213fb80e2b3e78d534d12f2eb83894c0.jpg ，求出L与x轴交点的横坐标 https://gss3.bdstatic.com/-Po3dSag_xI4khGkpoWK1HF6hhy/baike/s%3D113/sign=4759ab76e9f81a4c2232e8c8e42b6029/adaf2edda3cc7cd9c67a2ddb3b01213fb80e9158.jpg ，称x1为r的一次近似值。过点 https://gss2.bdstatic.com/-fo3dSag_xI4khGkpoWK1HF6hhy/baike/s%3D71/sign=43308263f1deb48fff69a3dff11f38a8/c995d143ad4bd113cd3aaf3058afa40f4bfb0538.jpg 做曲线 https://gss3.bdstatic.com/7Po3dSag_xI4khGkpoWK1HF6hhy/baike/s%3D59/sign=a638fa186259252da7171d0d359bf9a9/810a19d8bc3eb1354c3bafb9a41ea8d3fd1f4437.jpg 的切线，并求该切线与x轴交点的横坐标 https://gss2.bdstatic.com/9fo3dSag_xI4khGkpoWK1HF6hhy/baike/s%3D113/sign=265ea26696eef01f49141cc4d3ff99e0/71cf3bc79f3df8dc43d19493cf11728b461028c7.jpg ，称 https://gss2.bdstatic.com/-fo3dSag_xI4khGkpoWK1HF6hhy/baike/s%3D15/sign=4e7e68110bf79052eb1f433b0df3edbc/5d6034a85edf8db1a5c967660b23dd54574e74c8.jpg 为r的二次近似值。重复以上过程，得r的近似值序列，其中， https://gss0.bdstatic.com/94o3dSag_xI4khGkpoWK1HF6hhy/baike/s%3D129/sign=763132a7087b020808c93be35bd9f25f/6a63f6246b600c339f73c4ca184c510fd9f9a1ad.jpg 称为r的 https://gss2.bdstatic.com/-fo3dSag_xI4khGkpoWK1HF6hhy/baike/s%3D33/sign=670fbe609a22720e7fcee4f97acbeb58/5d6034a85edf8db1a5eb67660b23dd54574e74ee.jpg 次近似值，上式称为**牛顿**[**迭代**](https://baike.baidu.com/item/%E8%BF%AD%E4%BB%A3)**公式**。

用牛顿迭代法解非线性方程，是把非线性方程 https://gss3.bdstatic.com/-Po3dSag_xI4khGkpoWK1HF6hhy/baike/s%3D59/sign=5082ab3058afa40f38c6ced4aa6459d9/eaf81a4c510fd9f9f458496b272dd42a2834a460.jpg 线性化的一种近似方法。把 https://gss3.bdstatic.com/7Po3dSag_xI4khGkpoWK1HF6hhy/baike/s%3D32/sign=a646f8186259252da7171b06359bf9a2/bd3eb13533fa828bd9a187e1ff1f4134970a5a35.jpg 在点https://gss2.bdstatic.com/-fo3dSag_xI4khGkpoWK1HF6hhy/baike/s%3D15/sign=802826810d2442a7aa0ef9a0d04342de/6a63f6246b600c33993dc2ca184c510fd9f9a16f.jpg 的某邻域内展开成泰勒级数

https://gss3.bdstatic.com/-Po3dSag_xI4khGkpoWK1HF6hhy/baike/s%3D559/sign=b957953d49fbfbedd859367a41f1f78e/8601a18b87d6277f7dd7363a2a381f30e824fcef.jpg ，取其线性部分（即泰勒展开的前两项），并令其等于0，即

https://gss0.bdstatic.com/94o3dSag_xI4khGkpoWK1HF6hhy/baike/s%3D181/sign=a24d511560d0f703e2b291d439fb5148/37d3d539b6003af312d9db62372ac65c1038b654.jpg ，以此作为非线性方程https://gss3.bdstatic.com/-Po3dSag_xI4khGkpoWK1HF6hhy/baike/s%3D59/sign=5082ab3058afa40f38c6ced4aa6459d9/eaf81a4c510fd9f9f458496b272dd42a2834a460.jpg 的近似方程，若

https://gss2.bdstatic.com/-fo3dSag_xI4khGkpoWK1HF6hhy/baike/s%3D71/sign=8134fa0f72cf3bc7ec00cfedd1006a1d/060828381f30e9245ea49a334e086e061d95f7b4.jpg ，则其解为 https://gss3.bdstatic.com/-Po3dSag_xI4khGkpoWK1HF6hhy/baike/s%3D113/sign=4759ab76e9f81a4c2232e8c8e42b6029/adaf2edda3cc7cd9c67a2ddb3b01213fb80e9158.jpg ， 这样，得到牛顿迭代法的一个迭代关系式： https://gss0.bdstatic.com/94o3dSag_xI4khGkpoWK1HF6hhy/baike/s%3D129/sign=763132a7087b020808c93be35bd9f25f/6a63f6246b600c339f73c4ca184c510fd9f9a1ad.jpg 。