**Numerical Computation - Assignment 3**

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1. (I)

(a): **. Let . and we should find a point make equal to zero. The root must be smaller than and larger than zero** **and the function is continuous in the interval [0, 1]. Let .** **So, there must exist a point to make . Ans:**

(b):**. Let and we should find a point make equal to zero. When When .** **And the function is continuous in the interval [-1, ], So, there must exist a point to make . Ans:**

**(c): . Let and we should find a point make equal to zero. When . If . And the function is continuous in the interval [1, 2]. So, there must exist a point to make . Ans:**

(**II)**

**(a): Let . . . Therefore, we replace with . . . After two steps, we get the approximation root is 0.75.**

**(b): Let . . . Therefore, we replace with . . . After two steps, we get the approximation root is -0.75.**

**(c): Let . . . Therefore, we replace with . . . After two steps, we get the approximation root is 1.75**

1. **Let and , .**

**Step1: . .**

**Step2: . .**

**Therefore, the approximation root for this function is 0.7568.**

1. **According to the Taylor Polynomials, there is a function for the root ‘r’:**

**, .**

**, and then:**

**If , So:**

**,.. and .** **For the the convergence is quadratic,**

**Since .**

**For the . In this case, we could not use this method to**

**Calculate. So, we get to find the and**

**which means that**

**Let The . Therefore, which is a constant, the convergence is linear.**

1. **Let , the initial case is .**

**So, we should iterate step by step:**

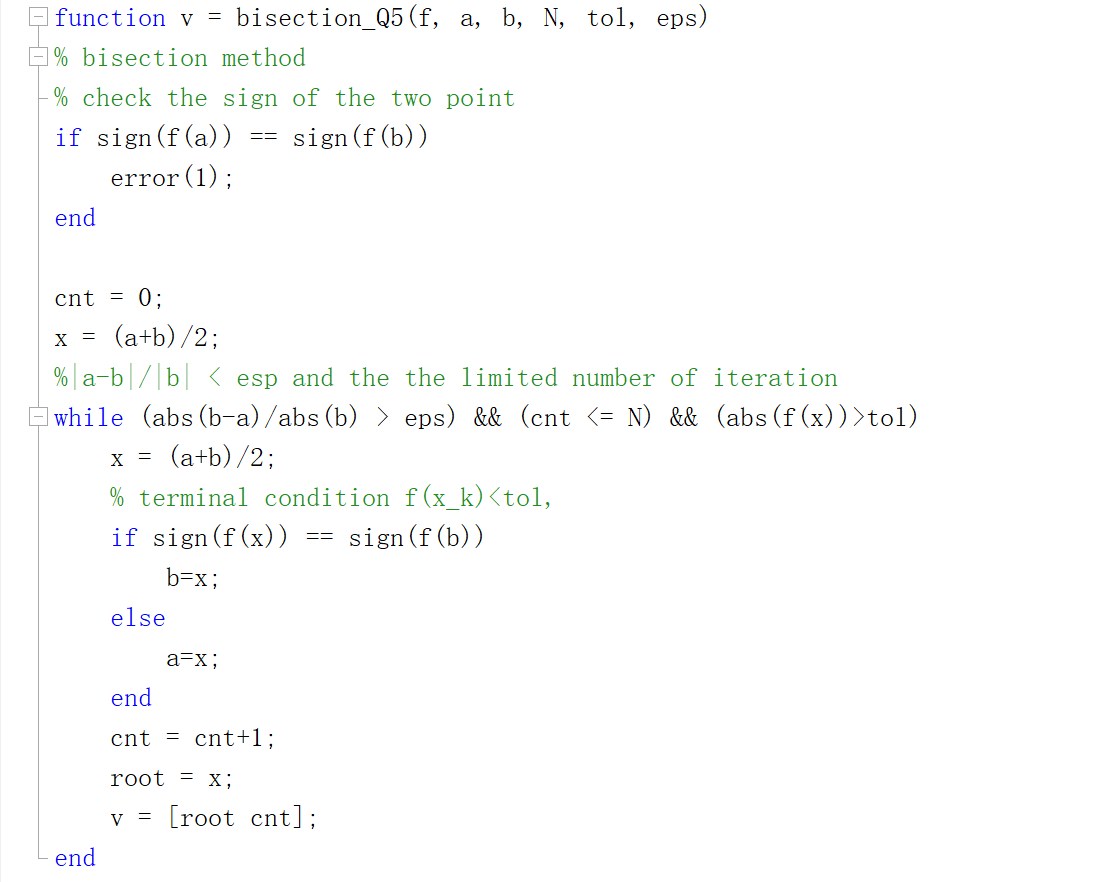
**, .**

**, .**

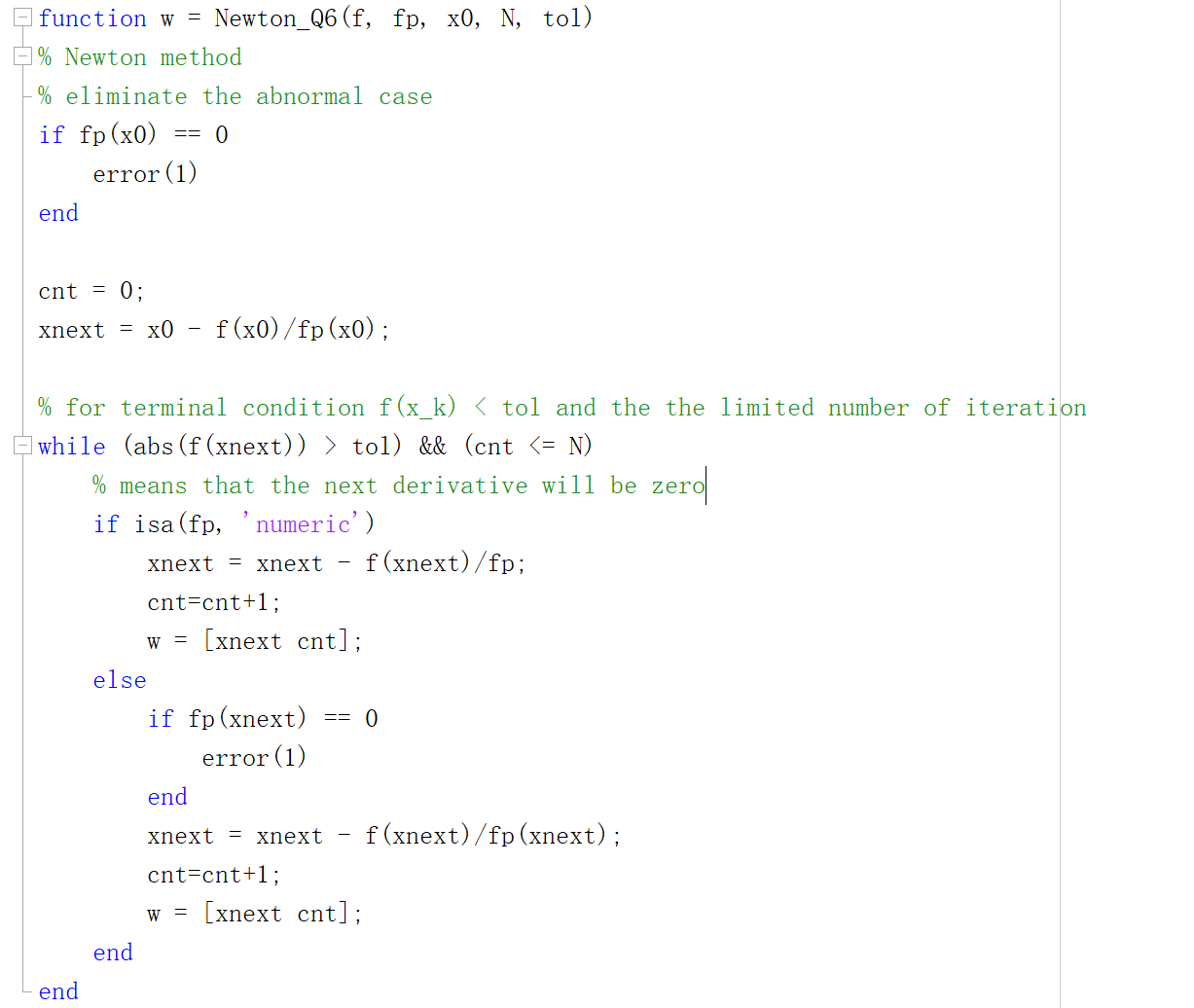
**Therefore, the approximation root for this function is 1.7423.**

**5.**

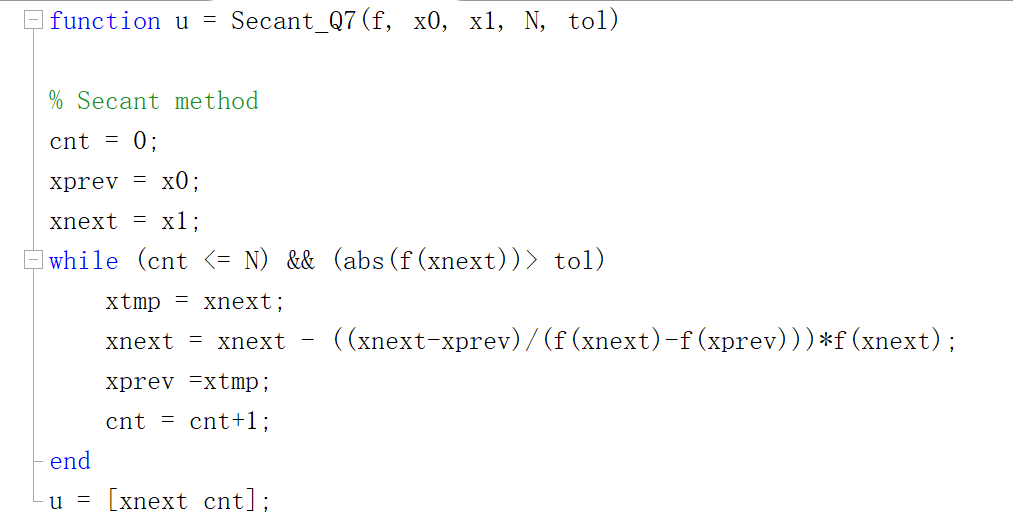
**We should satisfy three conditions. The first one is the error should not be larger eps (). The second one is the limited number of iterations, we cannot exceed the upper limit. The last one is that the result of the final substitute calculation is to be tolerated. ().**

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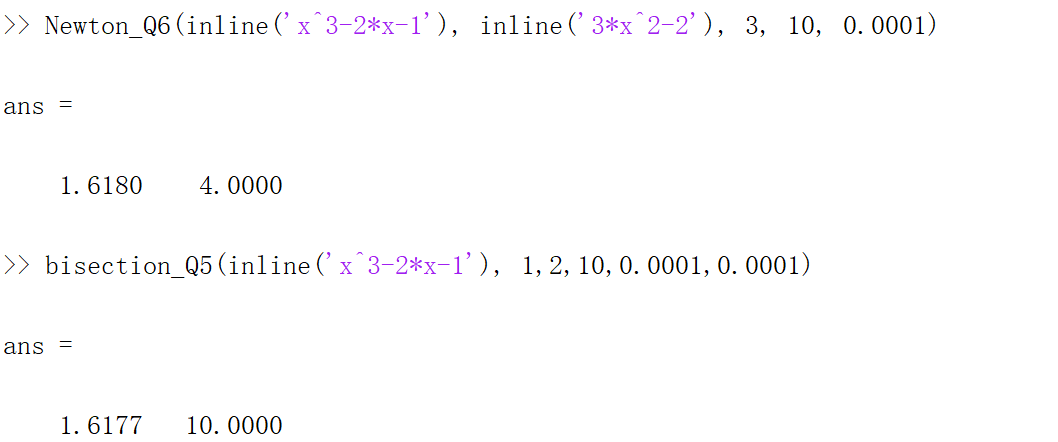
**The first one is the limited number of iterations; we cannot exceed the upper limit. The second one is that the result of the final substitute calculation is to be tolerated. We should pay attention to the case that the function’s derivative is numeric. And deal with the case that no derivative or derivative is equal to zero.**

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**In this question, we should satisfy three conditions. The first one is the limited number of iterations. we cannot exceed the upper limit.**

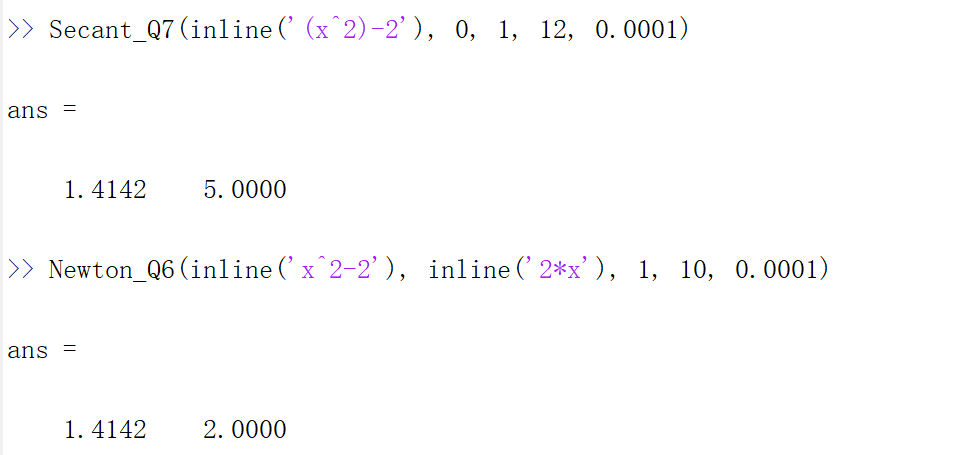
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1. **The Bisection method need 10 (maximum) iterations while the Newton method need 2 iterations. The Newton’s method is convergent faster than Bisection.**

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1. **The Secant method need iterate 5 steps while the Newton method need 2 steps.**

**Newton’s method is convergent faster than Secant method.**

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