Comparison of Nonlinear Solvers in MathCad

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There are three approaches to solving nonlinear problems. I suggest the following decision tree:

- **Nonlinear problem?**
  - yes
    - Multiple unknowns or has constraints?
      - yes
        - All roots needed?
          - yes
            - Use polyroots(coefs) function
          - no
            - Use root( f(x,...),x) function
        - no
          - Use Solve Block
      - no
        - Use polyroots(coefs) function

### Method Comparison

<table>
<thead>
<tr>
<th>Method</th>
<th>Advantage</th>
<th>Disadvantage</th>
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</table>
| polyroots( ) | 1. Can obtain all roots  
2. No need for initial guess  
3. Can obtain non-real roots | 1. Does not handle units  
2. Need to extract coefficients  
3. Does not handle multiple equations  
4. Can only handle polynomial equations |
| Root( )      | 1. Can obtain roots of non-polynomial equations including non-real solutions  
2. Can handle units               | 1. Solves only for one root  
2. Need initial guess  
3. Does not handle multiple equations |
| Given…Find( )| 1. Can handle multiple equations  
2. Can handle units  
3. Can handle constraints | 1. Need initial guesses for all unknowns  
2. Can not yield non-real solutions |