

A Recipe for Root-finding in MATLAB

Example: Find the value of θ that satisfies $\sin \theta = 4 - \sqrt{\theta}$ on $0 < \theta \leq 18$.

1. Rearrange the function into the form $f(x) = 0$	$f(x) = \sin \theta - 4 + \sqrt{\theta}$
2. Plot the function to identify possible roots a. Write a vectorized mfile to evaluate $f(x)$. b. Generate a range of x values and plot $f(x)$ c. Inspect $f(x)$ for locations where $f(x)$ crosses the axis	<pre>function f = sinsqrt(x) f = sin(x) - 4 + sqrt(x);</pre> <pre>>> x = linspace(0,18); >> plot(x,sinsqrt(x));</pre> Or <pre>>> xb = brakPlot('sinsqrt',0,18);</pre>
3. Call a root-finding function	<pre>>> r1 = bisect('sinsqrt',[12 14]); >> r2 = bisect('sinsqrt',[15 17]);</pre> Or <pre>xb = brakPlot('sinsqrt',0,18); for i=1:size(xb,1) r(i) = bisect('sinsqrt',xb(i,:)); end</pre>
4. Test the candidate roots to see if they satisfy $f(x) = 0$.	<pre>>> fr1 = sinsqrt(r1) >> fr2 = sinsqrt(r2)</pre>