

In[9]= $M = \{\{9, -2, 0, 0, 0\}, \{-2, 9, -2, 0, 0\}, \{0, -2, 9, -2, 0\}, \{0, 0, -2, 9, -2\}, \{0, 0, 0, -2, 9\}\}$

Out[9]= $\{\{9, -2, 0, 0, 0\}, \{-2, 9, -2, 0, 0\}, \{0, -2, 9, -2, 0\}, \{0, 0, -2, 9, -2\}, \{0, 0, 0, -2, 9\}\}$

In[10]= **Eigenvalues [M]**

Out[10]= $\{9 + 2\sqrt{3}, 11, 9, 7, 9 - 2\sqrt{3}\}$

In[11]= $MM = \{\{9, -2, 0, 0, 0, 0, 0\}, \{-2, 9, -2, 0, 0, 0, 0\},$
 $\{0, -2, 9, -2, 0, 0, 0\}, \{0, 0, -2, 9, -2, 0, 0\},$
 $\{0, 0, 0, -2, 9, -2, 0\}, \{0, 0, 0, 0, -2, 9, -2\}, \{0, 0, 0, 0, 0, -2, 9\}\}$

Out[11]= $\{\{9, -2, 0, 0, 0, 0, 0\}, \{-2, 9, -2, 0, 0, 0, 0\},$
 $\{0, -2, 9, -2, 0, 0, 0\}, \{0, 0, -2, 9, -2, 0, 0\},$
 $\{0, 0, 0, -2, 9, -2, 0\}, \{0, 0, 0, 0, -2, 9, -2\}, \{0, 0, 0, 0, 0, -2, 9\}\}$

In[12]= **Eigenvalues [MM]**

Out[12]= $\{9 + 2\sqrt{2 + \sqrt{2}}, 9 + 2\sqrt{2}, 9 + 2\sqrt{2 - \sqrt{2}}, 9, 9 - 2\sqrt{2 - \sqrt{2}}, 9 - 2\sqrt{2}, 9 - 2\sqrt{2 + \sqrt{2}}\}$

In[13]= **N [%]**

Out[13]= $\{12.6955, 11.8284, 10.5307, 9., 7.46927, 6.17157, 5.30448\}$

In[14]= **Sort [%]**

Out[14]= $\{5.30448, 6.17157, 7.46927, 9., 10.5307, 11.8284, 12.6955\}$

In[15]= $MMM = \{\{9, -2, 0, 0, 0, 0, 0, 0, 0, 0\}, \{-2, 9, -2, 0, 0, 0, 0, 0, 0, 0\},$
 $\{0, -2, 9, -2, 0, 0, 0, 0, 0, 0\}, \{0, 0, -2, 9, -2, 0, 0, 0, 0, 0\},$
 $\{0, 0, 0, -2, 9, -2, 0, 0, 0, 0\}, \{0, 0, 0, 0, -2, 9, -2, 0, 0, 0\},$
 $\{0, 0, 0, 0, 0, -2, 9, -2, 0, 0\}, \{0, 0, 0, 0, 0, 0, -2, 9, -2, 0\},$
 $\{0, 0, 0, 0, 0, 0, 0, -2, 9, -2\}, \{0, 0, 0, 0, 0, 0, 0, 0, -2, 9\}\}$

Out[15]= $\{\{9, -2, 0, 0, 0, 0, 0, 0, 0, 0\}, \{-2, 9, -2, 0, 0, 0, 0, 0, 0, 0\},$
 $\{0, -2, 9, -2, 0, 0, 0, 0, 0, 0\}, \{0, 0, -2, 9, -2, 0, 0, 0, 0, 0\},$
 $\{0, 0, 0, -2, 9, -2, 0, 0, 0, 0\}, \{0, 0, 0, 0, -2, 9, -2, 0, 0, 0\},$
 $\{0, 0, 0, 0, 0, -2, 9, -2, 0, 0\}, \{0, 0, 0, 0, 0, 0, -2, 9, -2, 0\},$
 $\{0, 0, 0, 0, 0, 0, 0, -2, 9, -2\}, \{0, 0, 0, 0, 0, 0, 0, 0, -2, 9\}\}$

In[16]:= **Eigenvalues [MMM]**

Out[16]= $\left\{ 9 + \sqrt{81 + \text{Root}\left[2\,160\,801\,389 + 147\,165\,045 \#1 + 4\,003\,858 \#1^2 + 54\,394 \#1^3 + 369 \#1^4 + \#1^5 \&, 5\right]}, \right.$
 $9 + \sqrt{81 + \text{Root}\left[2\,160\,801\,389 + 147\,165\,045 \#1 + 4\,003\,858 \#1^2 + 54\,394 \#1^3 + 369 \#1^4 + \#1^5 \&, 4\right]},$
 $9 + \sqrt{81 + \text{Root}\left[2\,160\,801\,389 + 147\,165\,045 \#1 + 4\,003\,858 \#1^2 + 54\,394 \#1^3 + 369 \#1^4 + \#1^5 \&, 3\right]},$
 $9 + \sqrt{81 + \text{Root}\left[2\,160\,801\,389 + 147\,165\,045 \#1 + 4\,003\,858 \#1^2 + 54\,394 \#1^3 + 369 \#1^4 + \#1^5 \&, 2\right]},$
 $9 + \sqrt{81 + \text{Root}\left[2\,160\,801\,389 + 147\,165\,045 \#1 + 4\,003\,858 \#1^2 + 54\,394 \#1^3 + 369 \#1^4 + \#1^5 \&, 1\right]},$
 $9 - \sqrt{81 + \text{Root}\left[2\,160\,801\,389 + 147\,165\,045 \#1 + 4\,003\,858 \#1^2 + 54\,394 \#1^3 + 369 \#1^4 + \#1^5 \&, 1\right]},$
 $9 - \sqrt{81 + \text{Root}\left[2\,160\,801\,389 + 147\,165\,045 \#1 + 4\,003\,858 \#1^2 + 54\,394 \#1^3 + 369 \#1^4 + \#1^5 \&, 2\right]},$
 $9 - \sqrt{81 + \text{Root}\left[2\,160\,801\,389 + 147\,165\,045 \#1 + 4\,003\,858 \#1^2 + 54\,394 \#1^3 + 369 \#1^4 + \#1^5 \&, 3\right]},$
 $9 - \sqrt{81 + \text{Root}\left[2\,160\,801\,389 + 147\,165\,045 \#1 + 4\,003\,858 \#1^2 + 54\,394 \#1^3 + 369 \#1^4 + \#1^5 \&, 4\right]},$
 $9 - \sqrt{81 + \text{Root}\left[2\,160\,801\,389 + 147\,165\,045 \#1 + 4\,003\,858 \#1^2 + 54\,394 \#1^3 + 369 \#1^4 + \#1^5 \&, 5\right]} \left. \right\}$

In[17]:= **N[%]**

Out[17]= {12.838, 12.365, 11.6194, 10.6617, 9.56926, 8.43074, 7.33834, 6.38056, 5.63499, 5.16203}