\[(Z) = f_n(x_1, \cdots, x_n) - f_n(s_{n-1}, 1, \cdots, 1) + 1 =

= \left( \sum_{k=1}^{n-1} \binom{s_k - 1}{k} \right) - \left[ \sum_{k=1}^{n-1} \binom{s_n - n + k - 1}{k} \right] + 1

= - \sum_{k=1}^{n-1} \binom{s_k - 1}{k} + \sum_{k=s_{n-1}}^{s_{n-1}} \binom{s_{k-1}}{k} + \binom{s_{n-1}}{s_{n-1} - n}

= - \sum_{k=1}^{n-1} \binom{s_k - 1}{k} + \binom{s_n - 1}{s_n - n}

Therefore,

\[g(x_1, \cdots, x_n) = #(X) + #(Y) + #(Z) =

= 2^{s_{n-1}} - 1 + \sum_{k=1}^{s_{n-1}} \binom{s_n - 1}{k} - \sum_{k=1}^{s_{n-1}} \binom{s_{k-1}}{k} + \binom{s_{n-1}}{s_n - n}

= 2^{s_{n-1}} - 1 + \sum_{k=1}^{s_{n-1}} \binom{s_n - 1}{k} - \sum_{k=1}^{s_{n-1}} \binom{s_{k-1}}{k}

SOME RESULTS IN TRIGONOMETRY

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Graphs of the six circular functions in the first quadrant yield some particularly elegant results involving the Golden Section.

Let \(\phi^2 + \phi = 1\), so that \(\phi = (\sqrt{5} - 1)/2 = 0.61803\) and notice that:

\[\arccos \phi = \arcsin \sqrt{1 - \phi^2} = \arcsin \sqrt{\phi} = 0.90459\]

\[\arcsin \phi = \arccos \sqrt{1 - \phi^2} = \arccos \sqrt{\phi} = 0.66621\]

Further, if \(\tan x = \cos x\), then \(\sin x = \cos^2 x\) and \(\sin^2 x + \sin x = 1\), that is, \(x = \arcsin \phi \) in which case \(\tan \arcsin \phi = \cos \arcsin \phi = \cos \arccos \sqrt{\phi} = \sqrt{\phi}\)

[Continued on p. 392.]