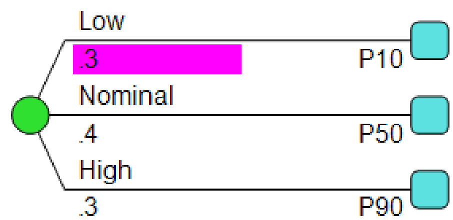
TECH NOTE

Probabilities for Low/Nominal/High Chance Nodes

A "roughly normal" probability distribution can be approximated by a three-state chance node as follows:

- **Probabilities:** 30%, 40%, 30%
- **Values:** P10, P50, P90



To see why this works, consider a standard normal distribution (mean = 0, standard deviation = 1)

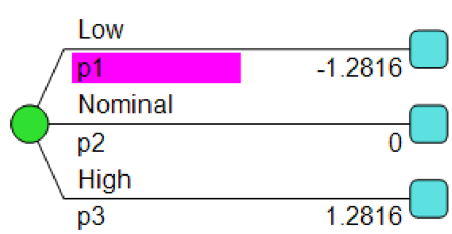
- The P10, P50, P90 are -1.2816, 0, +1.2816 (you can look these up in a table or just =NORMSINV(0.1) in Excel)
- Assume we will approximate this distribution with a three-state discrete distribution

We need to solve for p1, p2, p3. We want the expected value to be 0, which implies p1=p3 and we want the variance to be 1, so:

- $p1 * (0 - 1.2816)^2 + 0 + p3 * (0 + 1.2816)^2 = 1$

Using p3 = p1 and simplifying:

- $p1 = 1 / (2 * 1.2816^2)$
- $p1 = 0.3044$, or about 30%



p1 = p3 and p2 = 1 – p1 + p3

Hence 30%, 40%, 30% makes a good approximation. The same argument works for other normal distributions.