

Thus, we want

$$\left(\frac{1}{2}\right)^n \frac{1}{\sqrt{3}} < 10^{-5}$$

$$\Rightarrow \left(\frac{1}{2}\right)^n < \frac{\sqrt{3}}{2} 10^{-5}$$

$$n \ln \frac{1}{2} < \ln \frac{\sqrt{3}}{2} 10^{-5}$$

$$(-0.693)n < -11.657$$

$$n > 16.8$$

Thus we need $n \geq 17$. This is however an estimate from above.

| n | fixed-point | Error | | fixed-point | Error |
|-----|--------------|-------|----|--------------|----------------------|
| 0 | 0 | | 10 | 0.9097668988 | 1.3×10^{-4} |
| 1 | 0.5773502692 | | 11 | 0.9098980716 | |
| 2 | 0.7705651982 | | 12 | 0.9099577505 | 2.4×10^{-5} |
| 3 | 0.8487220383 | | 13 | 0.9099849036 | |
| 4 | 0.8825453308 | | 14 | 0.9099972581 | 1.2×10^{-5} |
| 5 | 0.8975975453 | | 15 | 0.9100028794 | |
| 6 | 0.9043784456 | | 16 | 0.9100054371 | 5.6×10^{-6} |
| 7 | 0.9074498995 | | 17 | 0.9100066009 | |
| 8 | 0.9088445654 | | | | 1.2×10^{-6} |
| 9 | 0.9094785537 | | | | |