

SALAMIN - BRENT

Initialize:

$$a_0 = 1$$

$$b_0 = \frac{1}{\sqrt{2}}$$

$$s_0 = \frac{1}{2}$$

Loop: $k = 1$

$$\text{compute } a_1 = \frac{1}{2} (a_0 + b_0) = \frac{1}{2} \left(1 + \frac{1}{\sqrt{2}} \right)$$

$$\text{compute } b_1 = \sqrt{a_0 b_0} = \sqrt{1 \cdot \frac{1}{\sqrt{2}}}$$

$$\text{compute } s_1 = s_0 - 2^1 (a_1^2 - b_1^2)$$

$$= \frac{1}{2} - 2 \left(\left(\frac{1}{2} \left(1 + \frac{1}{\sqrt{2}} \right) \right)^2 - \left(1 \cdot \frac{1}{\sqrt{2}} \right) \right)$$

should be close to π

$$\text{compute } p_1 = \frac{2a_1^2}{s_1} = \frac{2 \left(\frac{1}{2} \left(1 + \frac{1}{\sqrt{2}} \right) \right)^2}{\frac{1}{2} - 2 \left(\left(\frac{1}{2} \left(1 + \frac{1}{\sqrt{2}} \right) \right)^2 - \left(1 \cdot \frac{1}{\sqrt{2}} \right) \right)}$$

repeat with $k = 2$

then $k = 3, \dots$, upto m

return value: p_m