MATH 242 — 16 February 2024

Discuss:

In this class, what makes sense so far?
What questions do you currently have?

Salamin–Brent Algorithm

Init: $a_0 = 1$

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

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

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

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

$s_1 = s_0 - 2^k (a_1^2 - b_1^2)$

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

$p_1 = \frac{2a_1^2}{s_1}$

Continue with $a_2, b_2, s_2, p_2, \ldots$ etc.