Math 242-15 February 2023

$$
\text { POWER SERIES: } a_{0}+a_{1} x+a_{2} x^{2}+a_{3} x^{3}+\cdots=\sum_{k=0}^{\infty} a_{k} x^{k}
$$

A power series is an infinite series, but not every infinite series is a power series

SALAMIN-BRENT ALGORITHM:
initialize:

$$
\begin{aligned}
& a_{0}=1 \\
& b_{0}=\frac{1}{\sqrt{2}} \\
& s_{0}=\frac{1}{2}
\end{aligned}
$$

loop:

$$
\begin{aligned}
& k=1: \quad \begin{array}{l}
a_{1}=\frac{1}{2}\left(a_{0}+b_{0}\right)=\frac{1}{2}\left(1+\frac{1}{\sqrt{2}}\right) \\
b_{1}=\sqrt{a_{0} \cdot b_{0}}=\sqrt{1 \cdot \frac{1}{\sqrt{2}}} \\
s_{1}=s_{0}-2^{1}\left(a_{1}^{2}+b_{1}^{2}\right)=\cdots \\
p_{1}=\frac{2 a_{1}^{2}}{s_{1}} \approx 3,187 \ldots \\
k=2: \quad a_{2}=\cdots \\
b_{2} \cdots \\
s_{2}=\cdots \\
p_{2}=\cdots
\end{array}
\end{aligned}
$$

... repeat $m$ times...

