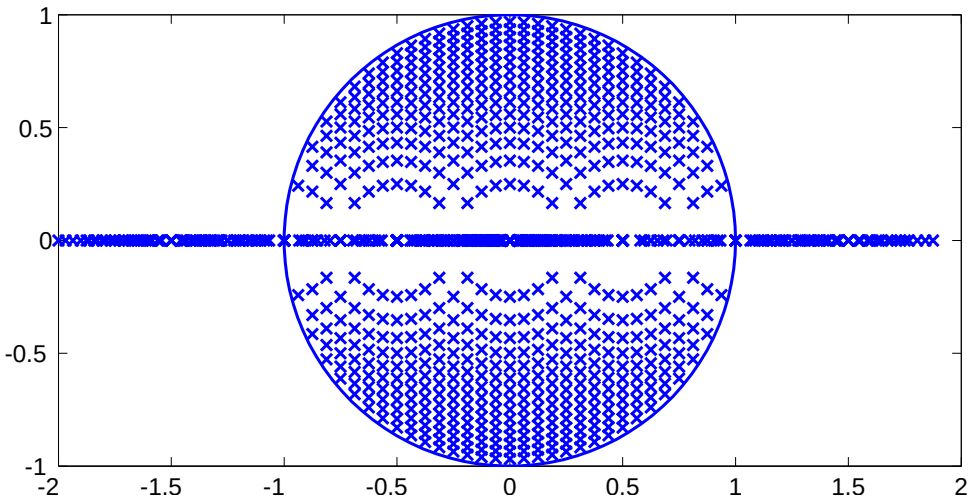
SENSITIVITY TO COEFFICIENT QUANTIZATION

- Small roundoff in coefficient: $c_k + \epsilon_{c_k} \Longrightarrow$ transfer function changes approximately to $H(z) + \epsilon_{c_k} \frac{\partial H(z)}{\partial c_k}$
- Sensitivity: $\frac{\partial H(z)}{\partial c_k}$
- Different implementations of same transfer function give different sensitivity.

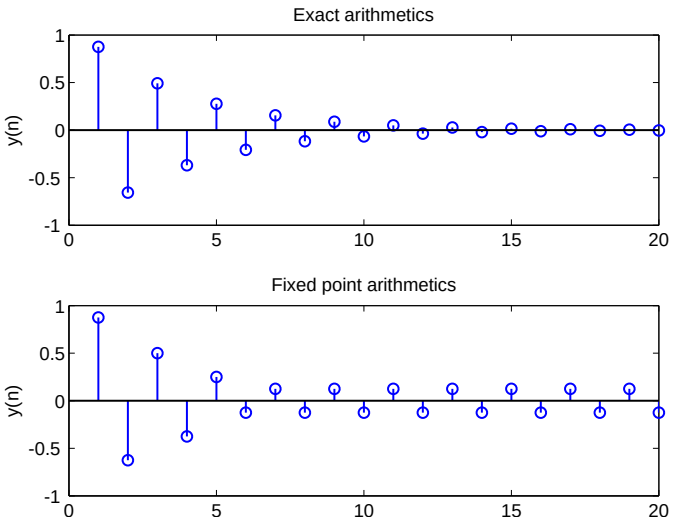
EX. POLE POSITIONS DUE TO QUANTIZED COEFFICIENTS

Example: $H(z) = \frac{1}{1+a_1 z^{-1}+a_2 z^{-2}}$, $-1 \leq a_1 < 1, 0 \leq a_2 < 1$, four bits each



”LIMIT CYCLES” — OSCILLATIONS DUE TO ROUND-OFF

Example: $y(n) = -\frac{3}{4}y(n-1)$, 4 bit fixed point numbers



”LIMIT CYCLES” — OSCILLATIONS DUE TO OVERFLOW

Example: $y(n) = \frac{7}{8}y(n-1) - \frac{7}{8}y(n-2)$, 4 bit fixed point numbers