Lecture 25: Noise

- Announcements:
- Project Slide Set #3 due Friday, April 26
- HW#7 online and due Friday, 5/10, at 9 a.m.
- Module 16 on Sensing Circuit Non-Idealities & Integration online
- Module 17 is online (on Noise and MDS)
- First 15 minutes of class were for HKN to go over course evaluation procedures
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- Reading: Senturia Chpt. 14, 15
- Lecture Topics:
  - Ideal Op Amps
  - Op Amp Non-Idealities
  - MEMS-Transistor Integration
    - Mixed
    - MEMS-First
    - MEMS-Last
- Reading: Senturia Chpt. 16
- Lecture Topics:
  - Minimum Detectable Signal
  - Noise
    - Circuit Noise Calculations
    - Noise Sources
    - Equivalent Input-Referred Noise
  - Gyro MDS
    - Equivalent Noise Circuit
    - Example ARW Determination
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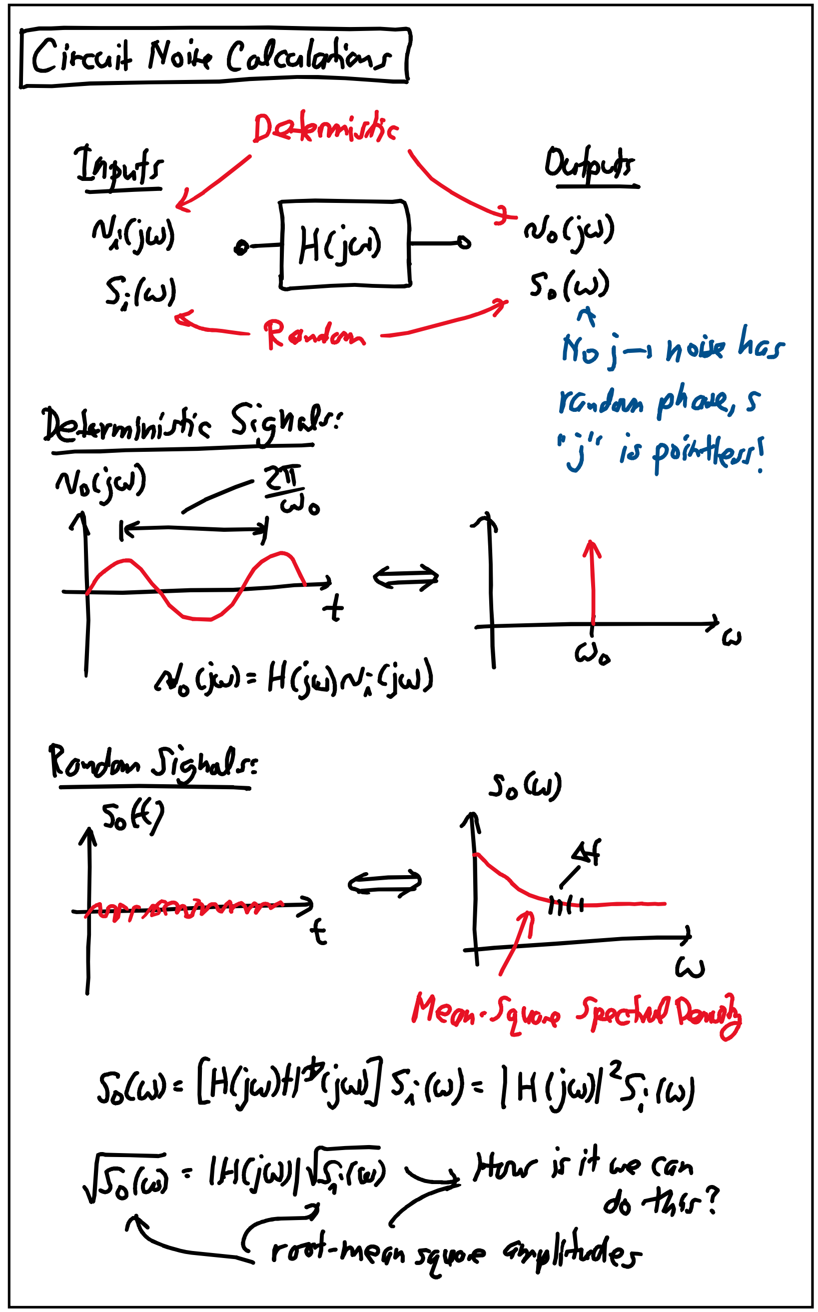
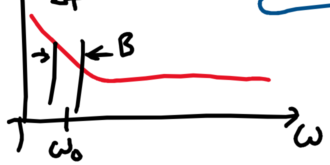
- Last Time:
- Going through MEMS/transistor integration …



Handling Noise Deterministically

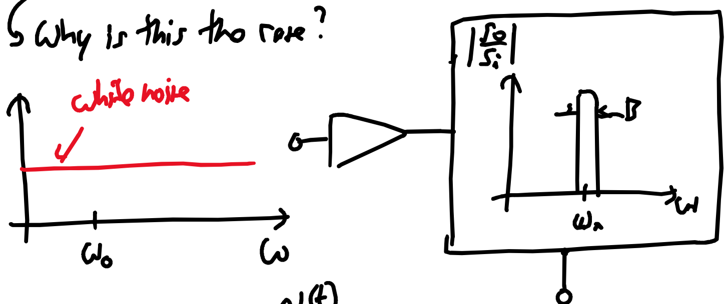
$$\frac{\overline{v_{n1}^2}}{\Delta f} = S_i(f) \rightarrow v_{n1} = \sqrt{S_i(f)\,B}$$

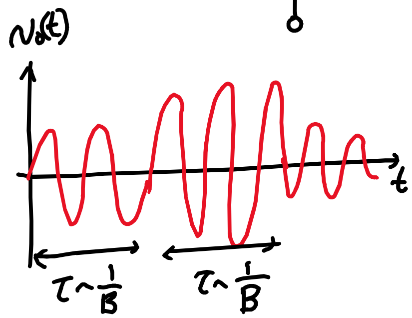
(B = bandwidth)



Can approximate this by a sinusoidal voltage generator (esp. when B is small, say 1Hz)

→ Why is this the case?





Neither the amplitude nor the phase of a signal can change appreciably within a time period $\frac{1}{B}$!