

EECS 373 ADC / DAC Practice Problems

Fall 2014

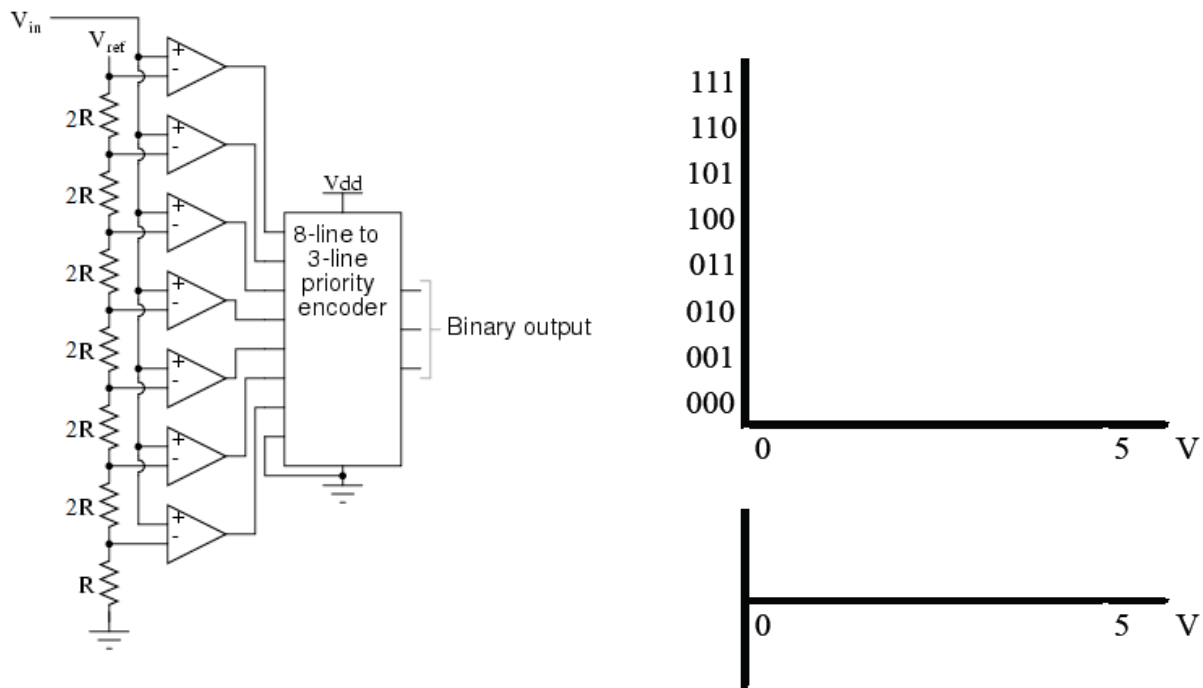
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NOTES:

- **THESE ARE PRACTICE PROBLEMS. THEY WILL NOT BE GRADED.**
- Suggestion: First, work through these problems on your own referencing class notes.
- After working through the problems, talk with classmates about your solutions.
- Solutions to these problems will be made available on Monday, Dec. 15, 2014.
- The final exam will include similar problems.

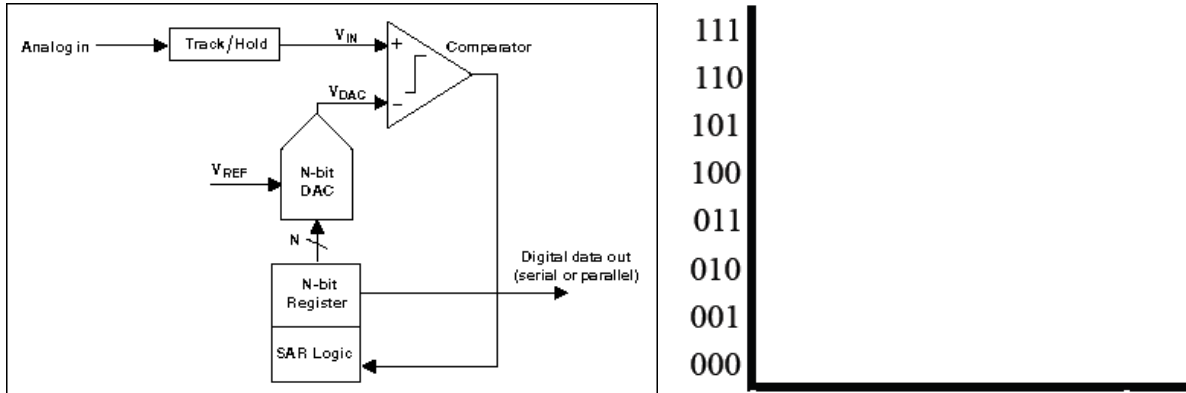
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- 1) Consider the following 3-bit ADC. Draw the conversion transfer function (binary output vs input voltage) on the top graph. Draw the quantization error transfer function (error voltage vs input voltage) on the bottom graph. Make sure the transition points are clear. Assume V_{ref} is 5V. [15]



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2) Assume you have a 3-bit SAR ADC. The analog input is 0.65 V and the V_{ref} is 1V. Show how the SAR would approximate the analog input over three cycles. Label the cycles on the x-axis and show the approximation as a meandering stair-step line on the graph. **[10]**



Name: _____ Username: _____

- 3) Data Converters. Consider the DAC and ADC converters found below. Assume V_{ref} is 8 V for the DAC and 10 V for the ADC and that both converters have an absolute error of up to $\pm 1/4$ LSB. The output of the ADC (D_{out}) is connected to the input of the DAC (D_{in}). If 4.2 V is supplied as the input to the ADC (V_{in}), the range of values might you get on the output of the DAC (V_{out}) is _____. Label every node/wire in the circuit with its value (analog or digital). Show your work. [15]

