1. Consider the following clocked comparator:

(a) Describe the circuit operation. What does each transistor do in the circuit?
(b) What is the purpose of using M9?
(c) What is the gain of the circuit in tacking (reset) mode?
(d) Calculate the input referred thermal noise sources?
2. Consider the following clocked comparator:

(a) Describe the detailed operation of the comparator. Specify the operation role of each transistor in the circuit.

(b) Use the following 0.35\textmu{}m MOS spice parameters that has been provided by MOSIS, and answer the following questions:

\[\text{http://www.mosis.org/cgi-bin/cgiwrap/umosis/swp/params/tsmc-035/t14a_2p4m-params.txt}\]

i. Using HSPICE or Cadence simulation, obtain the response of this comparator for a clock input of 500MHz. Choose the (W/L) ratios appropriately such that you can obtain a nice comparator operation at this frequency. (Clearly there is not a unique set of values for the transistor sizes). Use different arbitrary non-inverting inputs for the operation test. The inverting input is at the DC voltage of 1.65V.