UEC750: Tutorial Sheet-6

1. For the CMOS inverter with a power supply voltage of V_{DD} = 5 V, determine the fall time which is defined as the time elapsed between the time point at which V_{out} = V90% = 4.5 V and the time point at which V_{Out} = V10% = 0.5 V. Use both the average-current method and the differential equation method for calculating fall time. The output load capacitance is 1 pF. The nMOS transistor parameters are given as: $\mu_n C_{ox} = \frac{20\mu A}{V^2}, \frac{W}{L} = 10, V_{t0,n} = 1V$.

2. Consider a CMOS inverter with the following parameters:

$V_{T0,n} = 1.0$ V	$\mu_n C_{ox} = 45\ \mu A/V^2$	$(W/L)_n = 10$
$V_{T0,p} = -1.2$ V	$\mu_p C_{ox} = 25\ \mu A/V^2$	$(W/L)_p = 20$

The power supply voltage is 5 V, and the output load capacitance is 1.5 pF. Calculate the rise time and the fall time of the output signal using (i) exact method (differential equations) (ii) average current method