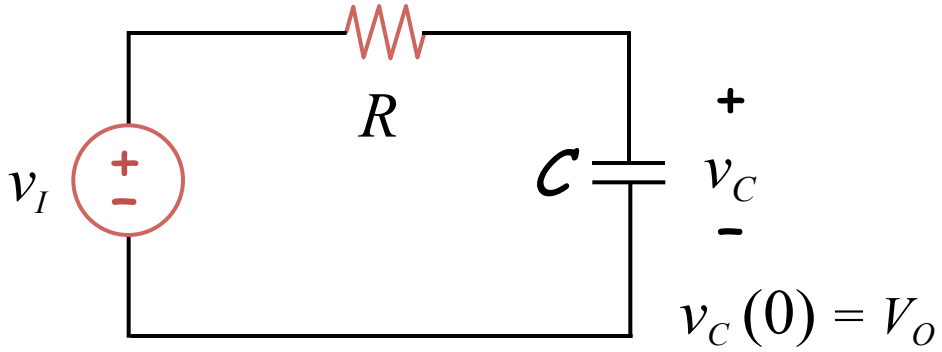
6.002x

CIRCUITS AND ELECTRONICS

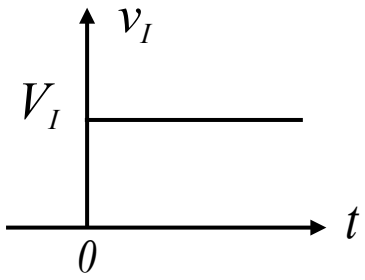
Digital Circuit

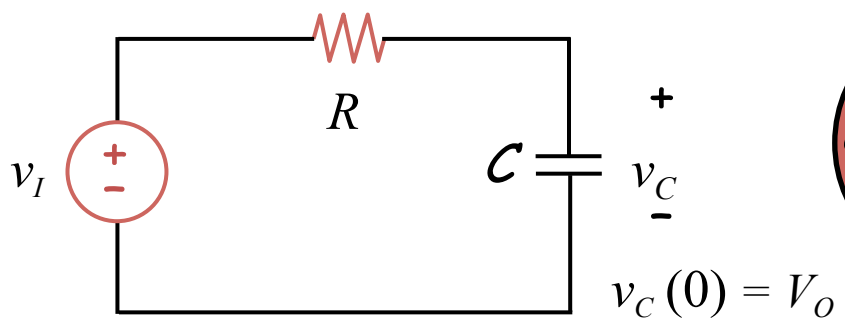


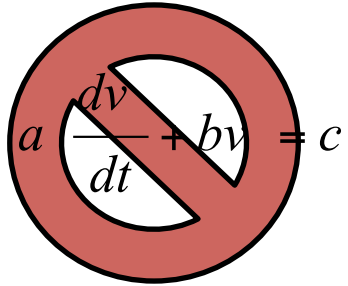
Review



An Intuitive Approach





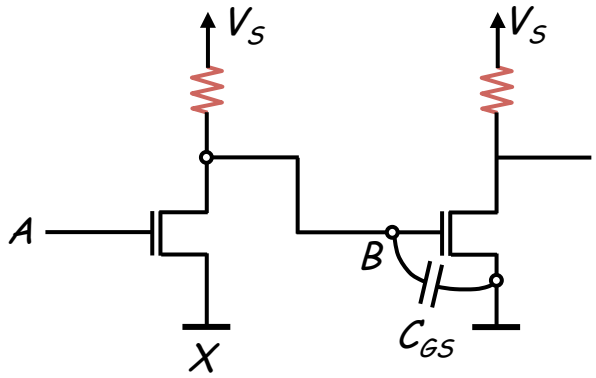


$$v_C = V_I + (V_O - V_I)\, e^{\frac{-t}{RC}} \qquad (1)$$

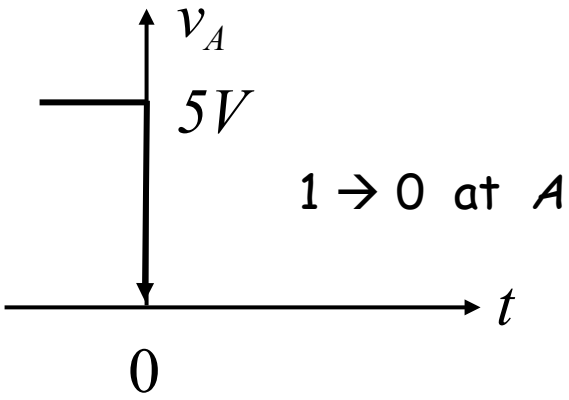
Let's apply the result to an inverter

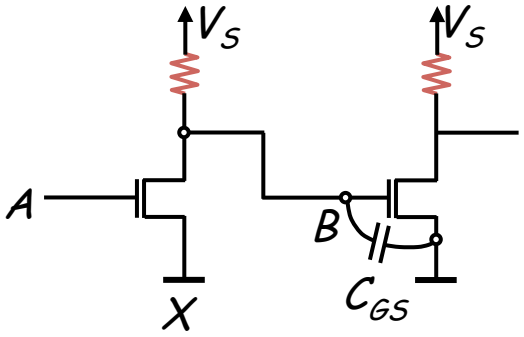


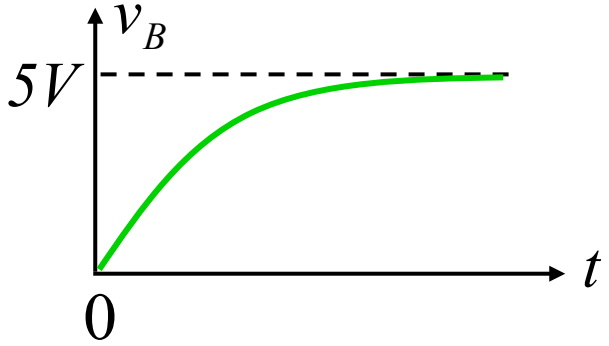
First, rising delay t_r at B



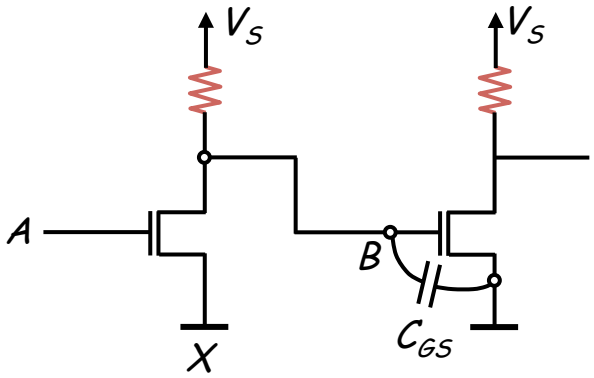
Rising delay t_r at B







Equivalent circuit for 0→1 at *B*

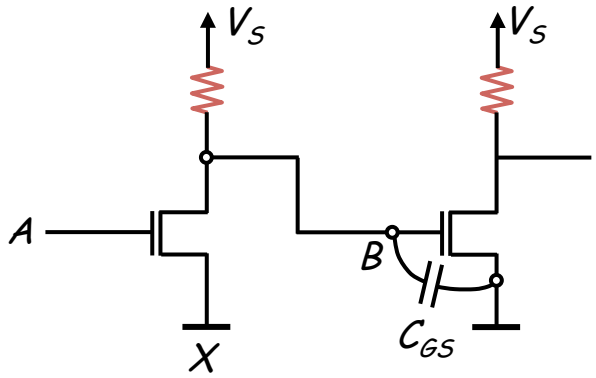


Rising delay t_r at B

$$v_B = V_S - V_S\, e^{\frac{-t}{R_L C_{GS}}}$$

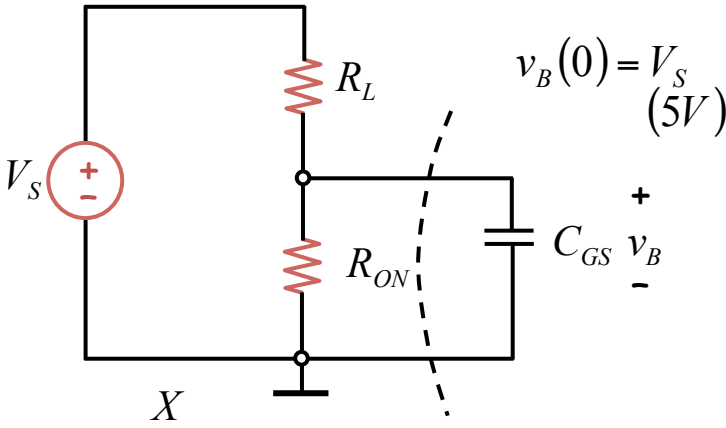
Numbers

Falling Delay at B t_f

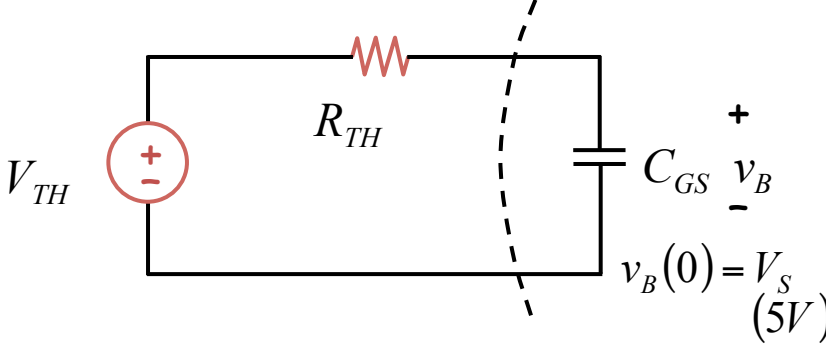


Falling Delay at B t_f

Equivalent circuit for 1 → 0 at *B*



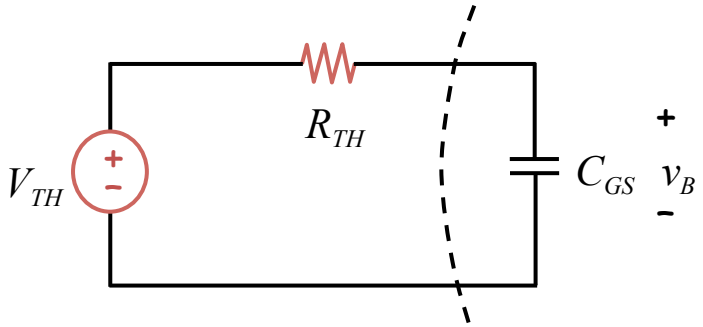
Falling Delay at B t_f



$$R_{TH} = R_L \,||\, R_{ON}$$

$$V_{TH} = V_S \frac{R_{ON}}{R_{ON} + R_L}$$

Falling Delay at B t_f



Numbers

Slower may be better

Slower may be better

6.002 expert saw the solution!

