EE-320 – Exercise 9 Solutions - Fall 2025

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$2(\frac{W}{L})_N$ generates a current equal to $2I_{Ref}$ that flows through PMOS current mirror

$$\Rightarrow I_{5,6} = \frac{(\frac{W}{L})_P}{(\frac{W}{L})_P} \times 2I_{Ref} = 2I_{Ref}$$

$$I_T = \frac{5(\frac{W}{L})_N}{(\frac{W}{L})_N} I_{Ref} = 5I_{Ref} \Rightarrow I_{1,2} = 2.5I_{Ref}$$

$$I_{3,4} = I_{1,2} - I_{5,6} = 2.5I_{Ref} - 2I_{Ref} = 0.5I_{Ref}$$

$$V_F = V_{DD} - |V_{GS,P}| = V_{DD} - |V_{TH,P}| - \sqrt{\frac{2 \times 2I_{Ref}}{\mu_P C_{ox}(\frac{W}{L})_P}}$$

$$V_Y = V_{DD} - |V_{GS,3}| = V_{DD} - |V_{TH,P}| - \sqrt{\frac{2 \times \frac{I_{Ref}}{2}}{\mu_P C_{ox}(\frac{W}{L})_P}}$$

$$V_P = V_{CM} - V_{GS1,2} = V_{CM} - V_{TH1,2} - \sqrt{\frac{2 \times 2.5I_{Ref}}{\mu_n C_{ox}(\frac{W}{L})_{1,2}}}$$