

Problem 7-16

From Eq. 7-55, $D = \frac{V_o}{V_d} \sqrt{\frac{I_o}{I_{oB,max}}}$

$I_{oB} = 0.493A$ (Problem 7-13)

$\therefore I_o = \frac{I_{oB}}{2} = 0.2465A$

$I_{oB,max} = 2.5$ (Problem 7-13)

$\therefore D = \frac{15}{12} \sqrt{\frac{0.2465}{2.5}} = 0.3925$; $R = \frac{V_o}{I_o} = \frac{15}{0.2465} = 60.85\Omega$

From the derivation of ΔV_o in problem 7-15

$$\Delta V_o = \frac{1}{470 \times 10^{-6}} \left[\left(1 - \frac{0.3925 \times 12}{15} \right) 50 \times 10^{-6} \times 0.2465 + \frac{1}{2} 150 \times 10^{-6} \frac{0.2465}{60.85} \right]$$

$$= 18.64 \text{ mV}$$