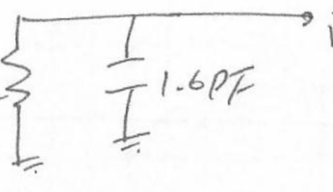
HW-2 solution problem-1



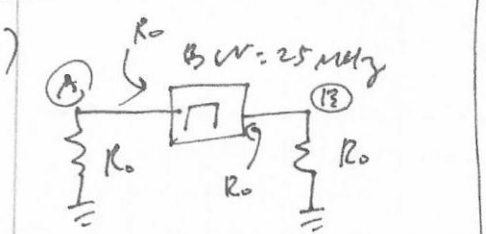
1) $\overline{v_o^2} = \frac{KT}{C}$

$= \frac{1.38 \times 10^{-23} J/K \cdot 300K}{1.6 \times 10^{-12} F}$

$= 2.5875 \times 10^{-9} \ V_{rms}^2$

$\therefore \overline{V_o} = 50.87 \ \mu V_{rms}$

3)



~~KTΔf @ A~~

at A

noise power

$= KT\Delta f$

$= 1.38 \times 10^{-23} \times 373 \times 25 \times 10^{6}$

$= 128.69 fW$

at B

noise power

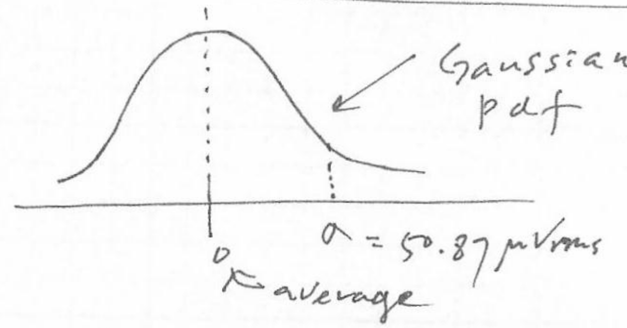
$= KT\Delta f$

$= 1.38 \times 10^{-23} \times 194 \times 25 \times 10^{6}$

$= 66.93 fW$

$\therefore$ 61.76 fW of net power flow from A to B.

2)



normalized random variable for 88 μVrms

$z = \frac{88 \mu V_{rms} - 0}{50.87 \mu V_{rms}}$

$= 1.7299 \approx 1.73$

→ Probability ($z \leq 1.73$)

$= 0.9582$

→ probability ($z > 1.73$)

$= 1 - 0.9582 = 0.0418$

→ probability ($z < -1.73$)

$= 0.0418$

$\therefore$ Probability for $\overline{v_o} > 88 \mu V$

= Probability ($z > 1.73$)

+ Probability ($z < -1.73$)

$= 0.0836$

$= 8.36\%$