3-5

$P_{loss,cu} = 20W$ $P_{cu} = I^2R$

If I is reduced by 1/2, $P_{cu} = \left(\frac{I}{2}\right)^2 R = \frac{I^2}{4}R = \frac{20W}{4} = \boxed{5W}$

Pcu would be reduced to 1/4 of previous loss

3-7 $P_{in} = 1250W$ $\eta = \frac{P_{out}}{P_{in}} = \frac{P_{in}-(P_{cu}+P_{core})}{P_{in}}$

$P_{cu} = 22W$

$P_{core} = 13W$ $\eta = \frac{1250W - (22W + 13W)}{1250W} = \boxed{.972 \text{ or } 97.2\%}$

3-10 $V_{HS} = 240V$

$V_{LS} = 120V$

$S_{rated} = 10\,KVA$

$R_L = 10\,\Omega$

A) find I_{LS}, $I_{LS} = \frac{V_{LS}}{R_L} = \frac{120V}{10\,\Omega} = \boxed{12A}$

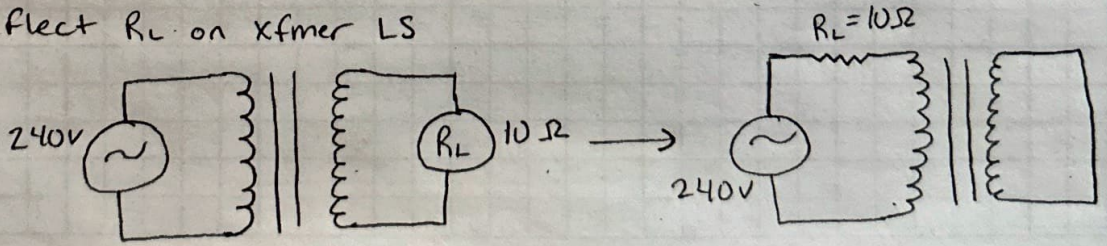
B) find I_{HS}, $\frac{V_{HS}}{V_{LS}} = \frac{I_{LS}}{I_{HS}}$ $I_{HS} = \frac{I_{LS}V_{LS}}{V_{HS}} = \frac{12A \cdot 120V}{240V} = \boxed{6A}$

C) find real input power (P_{in}), $P_{in} = P_{out}$

$V_1A_1 = V_2A_2$

$P_{in} = V_1A_1 = 240V \cdot 6A = \boxed{1440W}$

D) reflect R_L on xfmer LS



3-12 xfmer → 3KVA

$V_T = 120V$

$I_o = 1.5A$

$P = 33W$

A) Find I_{fe}, $I_{fe} = \frac{P}{V_T} = \frac{33VA}{120V} =$ **.275 A or 275 mA**

B) find R_{fe}, $R_{fe} = \frac{V_T}{I_{fe}} = \frac{120V}{.275A} =$ **436.36 Ω**

C) if $I_{fe} = .625A$, find I_m,

$I_m = \sqrt{I_o^2 - I_{fe}^2} = \sqrt{1.5^2 - .625^2} =$ **1.36 A**

D) if $I_m = 2.2A$, find X_m

$X_m = \frac{V_T}{I_m} = \frac{120V}{2.2A} =$ **54.54 Ω**