CS 350 HW4   Zheming Sun
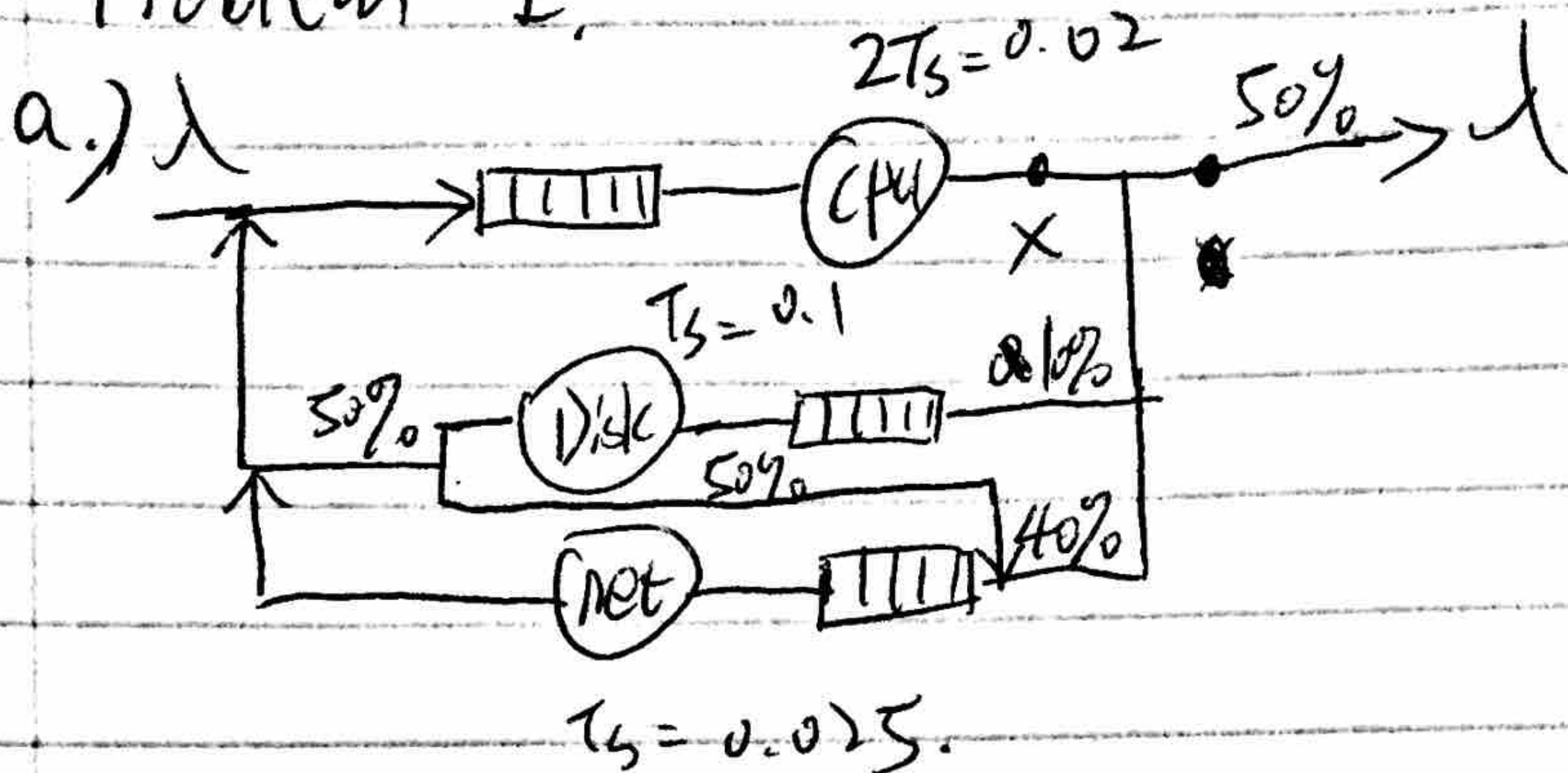mikesun@bu.edu.

Problem 1.

a.) λ

$$\begin{cases} \lambda_{cpu} = 80 \\ \lambda_{disk} = 8 \\ \lambda_{net} = 4 + 32 \\ \quad = 36 \end{cases}$$

b.) $50\% \, X = \lambda = 40$ $X = 80$ $\lambda_{cpu} = 80$

$\rho_{cpu} = \lambda_{cpu} \cdot (T_{s \, cpu}/2) = 0.8$

$\rho_{disk} = \lambda_{disk} \cdot T_{s \, disk} = 0.8$

$\rho_{net} = \lambda_{net} \cdot T_{s \, net} = 0.9$

$q_{cpu} = \dfrac{0.8}{1-0.8} = \dfrac{0.8}{0.2} = 4$

$q_{disk} = \dfrac{0.8}{1-0.8} = 4$

$q_{net} = \dfrac{0.9}{1-0.9} = \dfrac{0.9}{0.1} = 9$

$T_q = \dfrac{Total \; q}{\lambda} = \dfrac{4+4+9}{40} = 0.425$

c.) cpu slowdown : $T_q/T_s = \dfrac{q/\lambda}{T_s} = \dfrac{4/80}{0.02/2} = \dfrac{0.05}{0.01} = 5$

disk slowdown : $T_q/T_s = \dfrac{q/\lambda}{T_s} = \dfrac{4/8}{0.1} = 5$

largest slowdown

net slowdown : $T_q/T_s = \dfrac{q/36}{0.025} = \dfrac{0.25}{0.025} = 10$

$\boxed{\text{the bottleneck should be Net}}$