Diantao Yu: 33035089
Zengzhan Chen: 87965417

HW 1

P1.

a. 3*10^6/1.5*19^5=20

b.(i). Let N denote the number of users using packet-switching

P(a given user is transmitting)= $0.1*0.9^N$

(ii) P(n users transmit simultaneously) = C(n, 120) * $0.1^n * 0.9^{(120-n)}$

(iii) P(more than 21)= $\sum_{i=29}^{120} C(i,120) * 0.1^i * 0.9^{(120-i)}$ =0.0075

P2.

1. T = $\frac{L}{L+H} * W$

D1=$K * (\frac{L+H}{W} + \tau)$

2. T=$\frac{P}{P+H} * W$

D2= $K * (\frac{P+H}{W} + \tau) + (\frac{L}{P} - 1) * \frac{P+H}{W}$

3. If τ = 0

D1 = $K * (\frac{L+H}{W}) = \frac{P+H*P/L}{W} * (K * L/P)$

D2 = $(\frac{L}{P} - 1 + K) * \frac{P+H}{W}$

since L ≥ P, L/P ≥ 1, therefore, $(K * L/P)$ >> $(\frac{L}{P} - 1 + K)$

Thus, D1 > D2

4.

D2'(P) = $\frac{k-1}{w} - \frac{LH}{WP^2}$

D2'(P)=0 when P= $\sqrt{\frac{LH}{K-1}}$

So in conclusion, when we set packet size to $\sqrt{\frac{LH}{K-1}}$, we get minimum delay.