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CS 132 - COMPUTER NETWORKS - HOMEWORK 1

problem 1) (a) 3 Mbps = 3000 Kbps ; 3000 Kbps / 150 Kbps = 20 users

(b) i. 10%

ii. $Pr(x=n) = \binom{N}{n} p^n (1-p)^{N-n}$

$= \binom{120}{n} 0.1^n (0.9)^{120-n}$

iii. $Pr(X \geq 20) = 1 - \text{binomcdf}(120, 0.1, 20) = 0.007991192$

problem 2) (1)

$$\text{DELAY} = \overbrace{\frac{H}{W/nbps} + kr}^{\text{CONNECT REQUEST}} + \overbrace{\frac{H}{W/nbps} + kr}^{\text{CONNECT ACCEPT}} + \overbrace{\frac{L}{W/nbps} + kr}^{\text{MESSAGE}}$$

$$\text{THROUGHPUT} = \frac{L}{\text{DELAY} + \underbrace{\frac{H}{W/nbps} + kr}_{\text{disconnect request}} + \underbrace{\frac{H}{W/nbps} + kr}_{\text{disconnect accept}}}$$

(2)

$$\text{DELAY} = \frac{H+L}{W} + kr$$

$$\text{THROUGHPUT} = \frac{L}{\text{DELAY} + \underbrace{\frac{H}{W} + kr}_{\text{acknowledgement}}}$$

(3)

$$\text{DELAY} = \frac{L}{P}(H + kr) + \frac{L}{W}$$

$$\text{THROUGHPUT} = \frac{L}{\text{DELAY} + \underbrace{\frac{H}{W} + kr}_{\text{acknowledgement}}}$$

PROBLEM 2 CONT'D)

④ Circuit: $\frac{L}{\frac{4H}{W} + \frac{L}{W}}$; RANK 1

↓

MESSAGE: $\frac{L}{\frac{2H}{W} + \frac{L}{W}}$; RANK 2

↓

PACKET: $\frac{L}{\frac{LH}{P} + \frac{H}{W} + \frac{L}{W}}$; RANK 3

⑤ CIRCUIT: $\frac{2H}{W} + \frac{L}{W}$; RANK 2

MESSAGE: $\frac{H}{W} + \frac{L}{W}$; LEAST - RANK 1

PACKET: $\frac{LH}{P} + \frac{L}{W}$; MOST - RANK 3

⑥ P IS THE SAME SIZE AS L