#6.   B03901023

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電網導 HW1

#6.9 14 18.24
25.31

a) $d_{prop} = m/s$ (sec)

b) $d_{trans} = L/R$ (sec)

c) $d_{end} = m/s + L/R$ (sec)

d)   此 bit 剛離開 host A

e)   第一个 bit 仍在 link 之中，尚未抵達 host B.

f)   第一个 bit 已經抵達 host B.

g) $m = ?$

$$m = \left(\frac{L}{R}\right) \cdot S = \frac{120}{56 \times 10^3} \cdot 2.5 \times 10^8 = 536 \, km$$

#9   link. 1 Mbps   rate: 100 kbps

$p = 0.1$ 1 Mbps → 1 Gbps

a) $N = ?$

$$\frac{1G}{100k} = \frac{10^9}{100 \times 10^3} = 10^4 = 10000.$$

b)   packet switching : binomial distribution

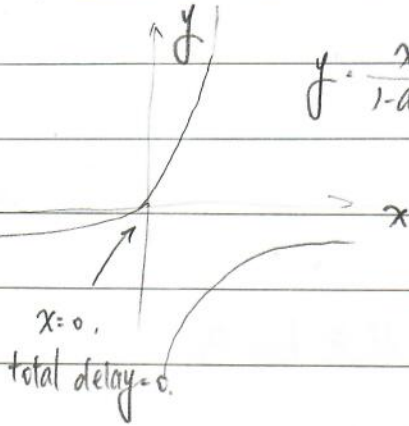$$\Rightarrow \sum_{n=N+1}^{M} \binom{M}{n} p^n (1-p)^{M-n}.$$

$N+1$ 是因为 "more than N users"

#14   a) transmission delay : L/R.

total delay

$$= \frac{IL}{R(1-I)} + \frac{L}{R} = \frac{L/R}{1-I}$$

b) let $x = 1/R$, total delay : $\dfrac{x}{1-ax}$.

$$y = \dfrac{x}{1-ax} \ , \ a \text{ given}$$

$x = 0$,
total delay = 0.

#18

#24 $40T = 40 \times 10^{12} \times 8$ bits.

$$\dfrac{40 \times 10^{12} \times 8}{100 \times 10^6} = 3200000 \ sec = \dfrac{3200000}{60^2 \times 24} \doteqdot 37 \ days.$$

^{cf} FedEx. overnight delivery → 24 hrs. ∴ cost ≤ 100$
以內就抵達   所以用 FedEx 較好.

#25. $d_{AtoB} = 20000\,km = 2 \times 10^7\,m$.

$R = 2\,Mbps$ $speed = 2.5 \times 10^8\,m/s$

a) $\dfrac{d_{AtoB}}{speed} = \dfrac{2 \times 10^7}{2.5 \times 10^8} = 0.08 = d_{prop}$

$R \times d_{prop} = 2 \times 10^6 \times 0.08 = 16 \times 10^4 = 160000\,bits$

b) file size $= 800000\,bits$

   $max = 160000\,bits$

c) bandwidth-delay product of a link

   $=$ maximum # of bits in the link

d) width of a bit $= 2 \times 10^7\,m / 160000 = 125\,m. / 1\,bit$

   football field length $= 109.73\,m$,   一个 bit 的 width 較寬

e) S/R

#31

a) $t = \dfrac{8 \times 10^6}{2 \times 10^6} = 4\,sec.$, | source host | $\xrightarrow{\;t\;}$ | 1st packet switch |

   $4\,sec \times 3\,hops = 12\,sec$,   total time from source host to destination host

b) $\dfrac{1 \times 10^4}{2 \times 10^6} = 5\,msec = 0.005\,sec$,   1st packet 從 src 到 1st packet switch.

   $2 \times 5m = 0.01\,sec$, 2nd packet 在 1st packet switch 被 received

c) $0.005\,sec \times 3\,hops = 15\,msec = 0.015$,   1st packet 抵達 destination.

   $0.015 + 799 \times 0.005 = 4.01\,sec$,   800th packet —"—

   ∴ delay in using message segmentation is significant less. ($\frac{1}{3}$rd)

Per-Duet