Network assignment 4

Qinglin Li, 5110309074

P2

Sum of 16-bit integers:

	00000000	00000001
	00000010	00000011
	00000100	00000101
	00000110	00000111
+	00001000	00001001
	00010100	00011001

Take 1's complement of the sum: $checksum = 11101011\ 11100110$

P7

(a) $y = Np(1-p)^{N-1}$
$\frac{dy}{dp} = N(1-p)^{N-1} - Np \cdot (N-1)(1-p)^{N-2}$
Let $\frac{dy}{dp} = 0$
$N(1-p)^{N-1} - Np \cdot (N-1)(1-p)^{N-2} = 0$
$\Longrightarrow p = 1$ or $p = \frac{1}{N}$
Since $p < 1$, $p = \frac{1}{N}$

(b) Plug in $p = \frac{1}{N}$
$y = (1-\frac{1}{N})^{N-1} = (1-\frac{1}{N})^{N} \cdot (1-\frac{1}{N})^{-1}$
$\lim_{N\to\infty} y = e^{-1} \cdot 1 = e^{-1}$

P8

$y = Np(1-p)^{2(N-1)}$
$\frac{\mathrm{d}y}{\mathrm{d}p} = N(1-p)^{2(N-1)} - Np \cdot 2(N-1)(1-p)^{2N-3}$
Let $\frac{\mathrm{d}y}{\mathrm{d}p} = 0$
$N(1-p)^{2(N-1)} - Np \cdot 2(N-1)(1-p)^{2N-3} = 0$
$\Longrightarrow p = 1$ or $p = \frac{1}{2N-1}$
Since $p < 1$, $p = \frac{1}{2N-1}$ Plug in $p = \frac{1}{2N-1}$
$y = \frac{N}{2N-1}(1 - \frac{1}{2N-1})^{2(N-1)}$
$\lim_{N\to\infty} y = e^{-1} \cdot \frac{1}{2} = \frac{1}{2e}$

P14

For a 1Mbps Ethernet: 100×512bit times $= 51.2ms$
For a 10Mbps Ethernet: 100×512bit times $= 5.12ms$

P15

Last bit of B's jam signal reaches A: $225 + 273 = 498$bit time
A start retransmission: $498 + 96 = 594$bit time
A's retransmission signal reaches B: $594 + 225 = 819$bit time

B returns to Step 2: $273 + 512 = 785$bit time

Since $819 - 785 < 96$, the retransmission won't collide and the retransmission of B will delay.