Question 1.
10 Gbps = 10^10 bit/s
1 TB = 2^40 byte * 8 bit/ byte = 2^43 bit ------ total data per pigeon carrys
280 km /40 kmph = 7 hour = 25200 s ------ total sec per pigeon travels
2^43 bit / 25200 s * num > 10^10 bits/s ------ speed per pigeon * num > 10Gbps
=> num > 28.6 Thus, at least 29 pigeons

Question 2.
(a) 1024B = 2^10 byte * 8 bit/ byte = 2 ^13 bit
(4 μs + 2^13 bit/ 10^3 bit/μs) * 4 = 48.768 μs ----- (delay + data length / speed) * 4

(b) ((1024 B - 150 B)/1024 B) * 1 Gbps = 0.854 Gbps ----- (actual data / packet size)*bandwidth

(c) 80 byte * 8 bit/ byte = 640 bit
((1024B-150B)*8 bit/ byte)/(4*(4 μs +80B*8 bit/ byte/10^3)+48.768 μs)*10^6 bps = 0.1Gbps

Question 3.
(a) 10 Gbps = 10240 Mbps 10^4 Mbps / 200 Mbps = 50 ----- total / per person

(b) $P = \binom{800}{n} * (0.04^n) * (0.96^{800-n})$

(c) $\sum_{i=51}^{800} P_i = \binom{800}{i} * (0.04^i) * (0.96^{800-i})$

Question 4.
(a) 1 Gbps = 10^9 bit/s 80 μs = 8*10^-5 s
10^9 bit/s * 8*10^-5 s = 8*10^4 bit -----bandwidth *delay product

(b) 54 Mbps = 54 * 10^6 bit/s 0.2 μs = 2*10^-7 s
54 * 10^6 bit/s * 2*10^-7 s = 10.8 bit -----bandwidth *delay product

(c) 35,786 km / 3 * 10^5 km/s ----- delay
100 * 10^6 bit/s * 35,786 km / 3 * 10^5 km/s = 1.2*10^7 bit -----bandwidth *delay product

Question 5. (correction: OK, I created an off by one mistake. they score 6 points in round 1, 5 points in round 2, etc. so is should really read 6-n+1.)
(a) 0.7^5 = 16.8% ----- win first five rounds
(b) 0.3*6 ----l
0.7*0.3*11 ----wl
0.7^2*0.3*15 ----wwl
0.7^3*0.3*18 ----wwwl
0.7^4*0.3*20 ----wwwwl
0.7^5*0.3*21 ----wwwwwl
0.7^6*21 ----wwwwww
= 13.137
(c) 0.3*1 + 0.7*0.3*2 +0.7^2*0.3*3 + 0.7^3*0.3*4 + 0.7^4*0.3*5+0.7^5*6 = 2.94
(d) m/n = 13.137/2.94 = 4.467

Question 6.

domains	registar	Date
uiuc.edu	University of Illinois at Urbana Champaign	18-Jul-1985
google.com	MARKMONITOR INC.	1997-09-15
goooogle.com	ENOM, INC.	02-aug-2001
kravets.org	Proxy Protection LLC	1999-09-01
acmilan.it	Milan A.C. S.p.a.	2007-03-01