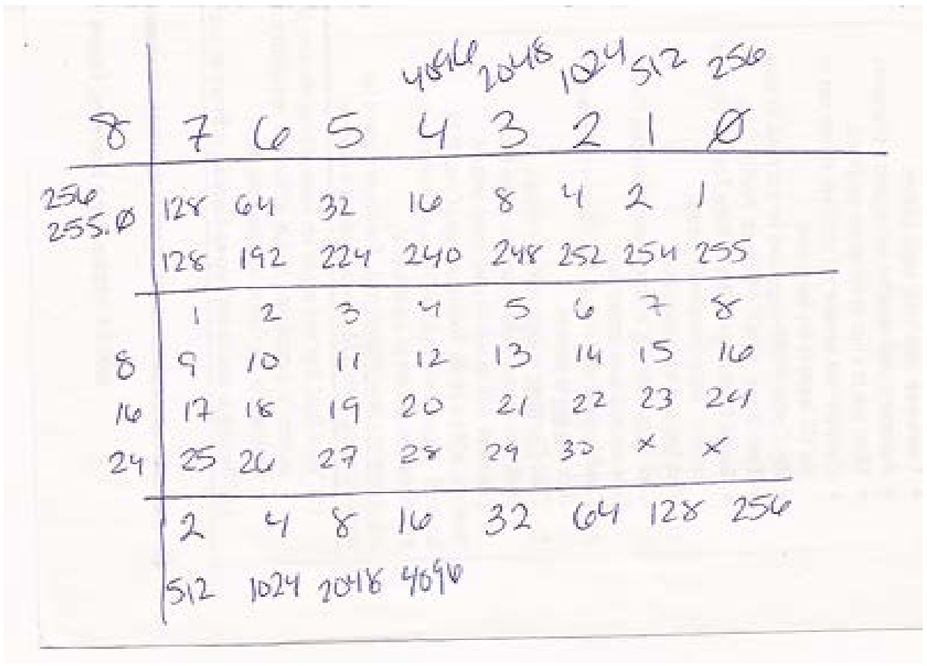
8 7 6 5 4 3 2 1 0



Part 1

8	7	6	5	4	3	2	1	0

Steps (to do in this spreadsheet or on separate piece of paper)

First row (C2:K2): Write out 8 thru 0, then draw a vertical line between 8 and 7 [completed]

Second row (C3:D3): fill in the corresponding binary power (e.g., 2^7=128, 2^6=64), which will indicate block size and numbers of hosts (-2) for /24 thru /30

Note (C3): for 2^8=256, the value is 255.0 in dotted decimal

Third row (D4:K4): starting on the right side of the veritcal line, aggregate values from the second row (e.g. 128+0=0, 128+64= 192, 192+32=224), which will indicate subnet mask and class

Fourth row (D5:K5): right of line, write out 1 thru 8, which will indicate borrowed bits and binary 1s

5th thru 7th rows (C6:K68): left of line, carry over last number from the previous row and write out next octect of numbers (e.g., 8 thru 16, 16 thru 24), which will indicate borrowed bits and prefix

Eighth row (D10:K10): right of line, use row of binary 1s (fourth row) to fill in binary power (e.g., 1^2=2, 2^2=4), which will indicate number of subnets based on borrowed bits 1 thru 8

Part 2

Hosts(-2)									
Binary 0s; Placeholder	8	7	6	5	4	3	2	1	0
Block Size; Hosts(-2)	256 / 255.0	128	64	32	16	8	4	2	1
Class; Subnet Mask		128	192	224	240	248	252	254	255
Binary 1s; Borrowed Bits		1	2	3	4	5	6	7	8
Borrowed Bits; /Prefix	8	9	10	11	12	13	14	15	16
Borrowed Bits; /Prefix	16	17	18	19	20	21	22	23	24
Borrowed Bits; /Prefix	24	25	26	27	28	29	30	X	X
Subnets		2	4	8	16	32	64	128	256
Subnets									

Steps (to do in this spreadsheet or on separate piece of paper)

Add a row above and a row below the table

Top row (K40:G40): from right to left, continue the sequence of binary numbers [256, 512, 1024, 2048, 4096], which will indicate number of hosts (-2) for /20 thru /24

Bottom row (D31:G31): right of line, continue the sequence of binary numbers [512, 1024, 2048, 4096], which will indicate number of subnets based on borrowed bits 9 thru 12

Optional (M27:M29): record the private IP address rangefor classes A , B, and C (e.g., 10.x.x.x)

COMPLETE

Hosts(-2)					4096	2048	1024	512	256
Binary 0s; Placeholder	8	7	6	5	4	3	2	1	0
Block Size; Hosts(-2)	256 / 255.0	128	64	32	16	8	4	2	1
Class; Subnet Mask		128	192	224	240	248	252	254	255
Binary 1s; Borrowed Bits		1	2	3	4	5	6	7	8
Borrowed Bits; /Prefix	8	9	10	11	12	13	14	15	16
Borrowed Bits; /Prefix	16	17	18	19	20	21	22	23	24
Borrowed Bits; /Prefix	24	25	26	27	28	29	30	X	X
Subnets		2	4	8	16	32	64	128	256
Subnets		512	1024	2048	4096				

10.0.0.0/8
172.16.0.0/12
192.168.0.0/16

Watch Video http://youtu.be/AunU9QsTofY

Hosts(-2)									
Binary 0s; Placeholder									
Block Size; Hosts(-2)									
Class; Subnet Mask									
Binary 1s; Borrowed Bits									
Borrowed Bits; /Prefix									
Borrowed Bits; /Prefix									
Borrowed Bits; /Prefix									
Subnets									
Subnets									

128	64	32	16	8	4	2	1	
1	0	0	0	0	0	0	0	128
1	1	0	0	0	0	0	0	192
1	1	1	0	0	0	0	0	224
1	1	1	1	0	0	0	0	240
1	1	1	1	1	0	0	0	248
1	1	1	1	1	1	0	0	252
1	1	1	1	1	1	1	0	254
1	1	1	1	1	1	1	1	255

Condensed Subnetting Table

Bit Column	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
Bit Value	128	64	32	16	8	4	2	1
SMask in Column	128	192	224	240	248	252	254	255
(C) Slash	/25	/26	/27	/28	/29	/30	NA	NA
(B) Slash	/17	/18	/19	/20	/21	/22	/23	/24
(A) Slash	/9	/10	/11	/12	/13	/14	/15	/16
Number of Subnets	2	4	8	16	32	64	128	256

Octet Value	Bits Set to 1 in Octet
0	0
128	1
192	2
224	3
240	4
248	5
252	6
254	7
255	8

Default Subnet Masks		
		IP Range
Class A	255.0.0.0	1-126
Class B	255.255.0.0	128-191
Class C	255.255.255.0	192-223

Hosts(-2)					4096	2048	1024	512	256
Binary 0s; Placeholder	8	7	6	5	4	3	2	1	0
Block Size; Hosts(-2)	256 / 255.0	128	64	32	16	8	4	2	1
Class; Subnet Mask		128	192	224	240	248	252	254	255
Binary 1s; Borrowed Bits		1	2	3	4	5	6	7	8
Borrowed Bits; /Prefix	8	9	10	11	12	13	14	15	16
Borrowed Bits; /Prefix	16	17	18	19	20	21	22	23	24
Borrowed Bits; /Prefix	24	25	26	27	28	29	30	X	X
Subnets		2	4	8	16	32	64	128	256
Subnets		512	1024	2048	4096				

Borrowed Bits	Subnets Created
1	2
2	4
3	8
4	16
5	32
6	64
7	128
8	256
9	512
10	1024
11	2048
12	4096

*** Borrowed bits are added to the default subnet mask**

Host Bits(h)		Hosts per Subnet
(h)		(2^h)-2
2	/30	2
3	/29	6
4	/28	14
5	/27	30
6	/26	62
7	/25	126
8	/24	254
9	/23	510
10	/22	1022
11	/21	2046
12	/20	4094

Watch Video http://youtu.be/AunU9QsTofY

Hosts(-2)					4096	2048	1024	512	256
Binary 0s; Placeholder	8	7	6	5	4	3	2	1	0
Block Size; Hosts(-2)	256 / 255.0	128	64	32	16	8	4	2	1
Class; Subnet Mask		128	192	224	240	248	252	254	255
Binary 1s; Borrowed Bits		1	2	3	4	5	6	7	8
Borrowed Bits; /Prefix	8	9	10	11	12	13	14	15	16
Borrowed Bits; /Prefix	16	17	18	19	20	21	22	23	24
Borrowed Bits; /Prefix	24	25	26	27	28	29	30	X	X
Subnets		2	4	8	16	32	64	128	256
Subnets		512	1024	2048	4096				

10.0.0.0/8
172.16.0.0/12
192.168.0.0/16

IP Address	
Class	
Borrowed Bits	
How Many Subnets	
How Many Hosts	
Block Size	
Subnet Mask	
First Subnet ID in CIDR	
First Usuable Address	
Last Usable Address	
Broadcast Address	
Second Subnet ID in CIDR	
First Usuable Address	
Last Usable Address	
Broadcast Address	
Third Subnet ID in CIDR	
First Usuable Address	
Last Usable Address	
Broadcast Address	
Last Subnet ID in CIDR	
First Usuable Address	
Last Usable Address	
Broadcast Address	

				4096	2048	1024	512	256
8	7	6	5	4	3	2	1	0
256 / 255.0	128	64	32	16	8	4	2	1
	128	192	224	240	248	252	254	255
	1	2	3	4	5	6	7	8
8	9	10	11	12	13	14	15	16
16	17	18	19	20	21	22	23	24
24	25	26	27	28	29	30	X	X
	2	4	8	16	32	64	128	256
	512	1024	2048	4096				

H	S	IP Address	205.110.1.0/24	199.1.2.0/24	130.19.0.0/16	134.22.0.0/16	15.0.0.0/8	15.0.0.0/8	150.0.0.0/16	207.14.3.0/24	207.14.3.0/24	157.14.0.0/16
1	1	Class	C						B			
5	5	Borrowed Bits	3									
6	2	How Many Subnets	8	(5) ?	(17) ?		(500) ?	(5000) ?	(5000) ?	(6) ?		(12) ?
2	6	How Many Hosts	(30) 30			(500) ?					(20) ?	
3	3	Block Size	32									
4	4	Subnet Mask	255.255.255.224									
7		First Subnet ID in CIDR	205.110.1.0/27									
12		First Usuable Address	205.110.1.1									
13		Last Usable Address	205.110.1.30									
11		Broadcast Address	205.110.1.31									
8		Second Subnet ID in CIDR	205.110.1.32/27									
		First Usuable Address	205.110.1.33									
		Last Usable Address	205.110.1.62									
		Broadcast Address	205.110.1.63									
9		Third Subnet ID in CIDR	205.110.1.64/27									
		First Usuable Address	205.110.1.65									
		Last Usable Address	205.110.1.222									
		Broadcast Address	205.110.1.223									
10		Last Subnet ID in CIDR	205.110.1.224/27									
		First Usuable Address	205.110.1.225									
		Last Usable Address	205.110.1.254									
		Broadcast Address	205.110.1.255									

2046 = 2^(32-21)-2

32766 = 2^(32-17)-2

				4096	2048	1024	512	256
8	7	6	5	4	3	2	1	0
256 / 255.0	128	64	32	16	8	4	2	1
	128	192	224	240	248	252	254	255
	1	2	3	4	5	6	7	8
8	9	10	11	12	13	14	15	16
16	17	18	19	20	21	22	23	24
24	25	26	27	28	29	30	X	X
	2	4	8	16	32	64	128	256
	512	1024	2048	4096				

DITTO!

H	S	IP Address	205.110.1.0/24	199.1.2.0/24	130.19.0.0/16	134.22.0.0/16	15.0.0.0/8	15.0.0.0/8	150.0.0.0/16	207.14.3.0/24	207.14.3.0/24	157.1
1	1	Class	C	C	B	B	A	A	B	C	C	
5	5	Borrowed Bits	3	3	5	7	9	13	21	3	3	
6	2	How Many Subnets	8	(5) 8	(17) 32	128	(500) 512	(5000) 8192	(5000) 8192	(6) 8	8	
2	6	How Many Hosts	(30) 30	30	2046	(500) 510	32766	2046	6	30	(20) 30	
3	3	Block Size	32	32	8	2	128	8	8	32	32	
4	4	Subnet Mask	255.255.255.224	255.255.255.224	255.255.248.0	255.255.254.0	255.255.128.0	255.255.248.0	255.255.255.248	255.255.255.224	255.255.255.224	255.2
7		First Subnet ID in CIDR	205.110.1.0/27	199.1.2.0/27	130.19.0.0/21	134.22.0.0/23	15.0.0.0/17	15.0.0.0/21	150.0.0.0/29	207.14.3.0/27	207.14.3.0/27	157.:
12		First Usuable Address	205.110.1.1	199.1.2.1	130.19.0.1	134.22.0.1	15.0.0.1	15.0.0.1	150.0.0.1	207.14.3.1	207.14.3.1	1
13		Last Usable Address	205.110.1.30	199.1.2.30	130.19.7.254	134.22.1.254	15.0.127.254	15.0.7.254	150.0.0.6	207.14.3.30	207.14.3.30	157.1
11		Broadcast Address	205.110.1.31	199.1.2.31	130.19.7.255	134.22.1.255	15.0.127.255	15.0.7.255	150.0.0.7	207.14.3.31	207.14.3.31	157.1
8		Second Subnet ID in CIDR	205.110.1.32/27	199.1.2.32/27	130.19.8.0/21	134.22.2.0/23	15.0.128.0/17	15.0.8.0/21	150.0.0.8/29	207.14.3.32/27	207.14.3.32/27	157.14
		First Usuable Address	205.110.1.33	199.1.2.33	130.19.8.1	134.22.2.1	15.0.128.1	15.0.8.1	150.0.0.9	207.14.3.33	207.14.3.33	15
		Last Usable Address	205.110.1.62	199.1.2.62	130.19.15.254	134.22.3.254	15.0.255.254	15.0.15.254	150.0.0.14	207.14.3.62	207.14.3.62	157.1
		Broadcast Address	205.110.1.63	199.1.2.63	130.19.15.255	134.22.3.255	15.0.255.255	15.0.15.255	150.0.0.15	207.14.3.63	207.14.3.63	157.1
9		Third Subnet ID in CIDR	205.110.1.64/27	199.1.2.64/27	130.19.16.0/21	134.22.4.0/23	15.1.0.0/17	15.0.16.0/21	150.0.0.16/29	207.14.3.64/27	207.14.3.64/27	157.14
		First Usuable Address	205.110.1.65	199.1.2.65	130.19.16.1	134.22.4.1	15.1.0.1	15.0.16.1	150.0.0.17	207.14.3.65	207.14.3.65	15
		Last Usable Address	205.110.1.222	199.1.2.222	130.19.23.254	134.22.5.254	15.1.128.254	15.0.23.254	150.0.0.22	207.14.3.94	207.14.3.94	157.1
		Broadcast Address	205.110.1.223	199.1.2.223	130.19.23.255	134.22.5.255	15.1.128.255	15.0.23.255	150.0.0.23	207.14.3.95	207.14.3.95	157.1
10		Last Subnet ID in CIDR	205.110.1.224/27	199.1.2.224/27	130.19.248.0/21	134.22.254.0/23	15.255.128.0/17	15.255.248.0/21	150.0.0.248/29	207.14.3.224/27	207.14.3.224/27	157.14.
		First Usuable Address	205.110.1.225	199.1.2.225	130.19.248.1	134.22.254.1	15.255.128.1	15.255.248.1	150.0.0.247	207.14.3.225	207.14.3.225	157
		Last Usable Address	205.110.1.254	199.1.2.254	130.19.255.254	134.22.254.254	15.255.255.254	15.255.255.254	150.0.0.254	207.14.3.254	207.14.3.254	157.14
		Broadcast Address	205.110.1.255	199.1.2.255	130.19.255.255	134.22.255.255	15.255.255.255	15.255.255.255	150.0.0.255	207.14.3.255	207.14.3.255	157.14

2046 = 2^(32-21)-2

32766 = 2^(32-17)-2