Some Subnetting Practice Problem Solutions

practice problem

1. What is 23.183.62.51 in binary?

| Solution:  dec bin  23 0001 0111  183 1011 0111  62 0011 1110  51 0011 0011 |
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2. What class address is this?

| Solution: It begins with a 0, so it’s an A. |
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3. If no subnetting has been done, on what network is it (in CIDR notation)?

| Solution: It’s an A, so if no subnetting has been done, the first byte is used for the network part of the address. The network is:  23.0.0.0/8 |
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4. How many hosts can be put on a network of this class?

| Solution: 8 bits are used for the network part. This leaves 24 bits for the host part. With 24 bits, we can specify about 224 hosts. |
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5. How many networks of this class are possible?

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| Solution: 8 bits are used for the network part, but the first bit must be a 0. There are 27 possibilities. |
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6. What is the natural netmask of a network of this class?

| Solution: 8 bits are used for the network part. The netmask is the IP address with 8 1s and 24 0s. This is 255.0.0.0 |
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7. Break this network into 8 subnets:

(a) What is the address of each subnet (in CIDR notation)?

| Solution: We have:  23 0 0 0  0001 0111 0000 0000 0000 0000 0000 000  To form the 8 subnets, we steal the first three bits of the host part (*i.e.*, the first 3 bits of the 2nd byte), and give it to the network part. The 8 possibilities for these three bits are:  000  001  010  011  100  101  110  111  These first three bits are in the 128s, 64s, and 32s column of the 2nd byte, so they represent the values:  000 0  001 32  010 64  011 64+32=96  100 128  101 128+32=160  110 128+64=192  111 128+64+32=224  The 8 subnets are therefore:  23.0.0.0/11  23.32.0.0/11  23.64.0.0/11  23.96.0.0/11  23.128.0.0/11  23.160.0.0/11  23.192.0.0/11  23.224.0.0/11 |
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Page 2

| They’re all /11s because we’re now using 11 bits for the network part and not 8. |
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(b) How many hosts can be put on each subnet?

| Solution: 11 bits are used for the network part. This leaves 21 bits for the host part, so there’s roughly 221 possible hosts. |
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(c) What is the netmask of each subnet?

| Solution: We’re using 11 bits for the network part. The netmask is the IP address that consists of 11 1s on the left hand side and 21 0s on the right hand side. This is: 255 224 0 0  1111 1111 1110 0000 0000 0000 0000 0000 |
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another practice problem

8. What is 207.245.83.199 in binary?

| Solution:  dec bin  207 1100 1111  245 1111 0101  83 0101 0011  199 1100 0111 |
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9. What class address is this?

| Solution: It begins with a 110, so it’s a C. |
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10. If no subnetting has been done, on what network is it (in CIDR notation)?

| Solution: It’s a C, so if no subnetting has been done, the first three bytes are used for the network part of the address. The network is:  207.245.83.0/24 |
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11. How many hosts can be put on a network of this class?

Page 3

| Solution: 24 bits are used for the network part. This leaves 8 bits for the host part. With 8 bits, we can specify about 28 hosts. |
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12. How many networks of this class are possible?

| Solution: 24 bits are used for the network part, but the first three bits must be 110. There are 221 possibilities. |
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13. What is the natural netmask of a network of this class?

| Solution: 24 bits are used for the network part. The netmask is the IP address with 24 1s and 8 0s. This is 255.255.255.0 |
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14. Break this network into 4 subnets:

(a) What is the address of each subnet (in CIDR notation)?

| Solution: We have:  207 245 83 0  1100 1111 1111 0101 0101 0011 0000 0000  network part host part  To form the 4 subnets, we steal the first two bits of the host part (*i.e.*, the first 2 bits of the 2nd byte), and give it to the network part. The 4 possibilities for these two bits are:  00  01  10  11  These first two bits are in the 128s and 64s column of the 2nd byte, so they represent the values:  00 0  01 64  10 128  11 128+64=192  The 8 subnets are therefore:  They’re all /11s because we’re now using 11 bits for the network part and not 8. *•* How many hosts can be put on each subnet?  207.245.83.0/26  207.245.83.64/26  207.245.83.128/26  207.245.83.192/26  26 bits are used for the network part. This leaves 6 bits for the host part, so there’s roughly 26 = 64 possible hosts. |
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Page 4

(b) What is the netmask of each subnet?

| Solution: We’re using 26 bits for the network part. The netmask is the IP address that consists of 26 1s on the left hand side and 6 0s on the right hand side. This is: 255 255 255 192  1111 1111 1111 1111 1111 1111 1100 0000 |
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still another practice problem.

To show that we don’t always start at the left-most bits of each byte. Consider the network 23.160.0.0/12.

15. How many hosts can be put on this network?

| Solution: 12 bits are used for the network part. This leaves 20 bits for the host part, so approximately 220 hosts. |
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16. What is the mask for this network?

| Solution: It’s the IP address with 12 1s on the left hand side and 20 0s on the right hand side, so:  255 240 0 0  1111 1111 1111 0000 0000 0000 0000 0000 |
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17. Break the network into 8 subnets:

(a) What is the address of each subnet (in CIDR notation)?

| Solution: To break it into 8 subnets, we need to steal 3 bits from the host part and give it to the network part. These bits are in the 13th, 14th, and 15th position, *i.e.*, the 5th, 6th, and 7th bits of the 2nd byte.  The 8 possibilities for the three bits are:  000  001  010  011  100  101  110  111  These three bits are in the 8s, 4s, and 2s column, so they represent: |
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Page 5

| 000 0  001 2  010 4  011 4+2=6  100 8  101 8+2=10  110 8+4=12  111 8+4+2=14  We started out with the address 23.160.0.0/12, so the full 2nd byte of each subnet will then be:  1010 0000 0  1010 0010 162  1010 0100 164  1010 0110 166  1010 1000 168  1010 1010 170  1010 1100 172  1010 1110 174  So the subnets are:  23.160.0.0/15  23.162.0.0/15  23.164.0.0/15  23.166.0.0/15  23.168.0.0/15  23.170.0.0/15  23.172.0.0/15  23.174.0.0/15 |
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(b) How many hosts can be put on each subnet?

| Solution: 15 bits are used for the network part, so 17 bits are used for the host part. This gives us approximately 217 hosts per subnet. |
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(c) What is the netmask of each subnet?

| Solution: The mask is the IP address with 15 1s on the left hand side and 17 0s on the right hand side, so:  1111 1111 1111 1110 0000 0000 0000 0000  255 254 0 0 |
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Page 6