1. Given that a frame is formatted as follows:

| Destination Hardware Address | Source Hardware Address | Frame Type | Frame Data |
|---|---|---|---|
| 6 Bytes | 6 Bytes | 2 Bytes | 46 - 1500 Bytes |

And given that a datagram is formatted as follows:

| Byte | 0 | | | | | | | | 1 | | | | | | | | 2 | | | | | | | | 3 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| bit | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 |
| 0 | Version | | | | Header Length | | | | Type Of Service | | | | | | | | Total Length | | | | | | | | | | | | | | | |
| 4 | Identification | | | | | | | | | | | | | | | | Flags | | | | Fragment Offset | | | | | | | | | | | |
| 8 | TTL | | | | | | | | Type | | | | | | | | Header Checksum | | | | | | | | | | | | | | | |
| 12 | Source IP Address | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | Destination IP Address | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Optional | IP Options (May Be Omitted) | | | | | | | | | | | | | | | | | | | | | | | | Padding | | | | | | | |
| 20 | IP Payload Data | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

And given the following frame with an encapsulated datagram:

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8C | 97 | EC | D0 | BE | C9 | E8 | 0B | E5 | AF | 8D | C8 | 08 | 00 | 45 | 8E |
| 00 | 72 | 55 | 4A | 73 | AE | A4 | 4A | A7 | B7 | C2 | 0E | 6F | E7 | 44 | 42 |
| 53 | 6A | 65 | CE | CA | 75 | C0 | 2C | 92 | 2F | 4D | B9 | C0 | 1A | 46 | A8 |
| C4 | A4 | F3 | 39 | 32 | F5 | B7 | A3 | F3 | 85 | AB | A7 | BC | 10 | 9F | C5 |
| 2B | 11 | AF | 23 | 0E | BA | 2D | 67 | ED | A5 | 1B | 08 | 68 | 86 | 11 | 6F |
| 92 | 46 | D8 | C1 | 66 | 07 | 34 | E5 | FF | DD | A2 | A4 | E0 | 8A | C5 | BB |
| BE | 56 | 1E | 94 | 32 | C8 | C1 | 88 | 51 | E3 | E1 | CD | 44 | 29 | 9C | 3A |
| CC | 20 | C9 | 2F | FC | 52 | 81 | 98 | EC | 29 | D6 | 9E | DF | 59 | 81 | 39 |

a. Find the destination hardware address.
b. Find the source hardware address.
c. What type of frame is this?
d. What is the Identification?
e. What Flag(s) are set in the IP header?
f. What is the fragment offset?
g. What is the TTL count?
h. What is the Header Checksum?
i. Find the source IP address.
j. What class is the source IP address?
k. What is the network ID in the source IP address?
l. What is the host ID in the source IP address?
m. Write the source IP address in dotted decimal notation.
n. Find the destination IP address.
o. What class is the destination IP address?
p. What is the network ID in the destination IP address?
q. What is the host ID in the destination IP address?
r. Write the destination IP address in dotted decimal notation.
s. If the IP header includes no options or padding, what are the first five bytes of the datagram data?
t. Can this message be delivered directly by the source to the destination, or will it require routers to handle the message. Explain.

2. Given that a frame is formatted as follows:

| Destination Hardware Address | Source Hardware Address | Frame Type | Frame Data |
|---|---|---|---|
| 6 Bytes | 6 Bytes | 2 Bytes | 46 - 1500 Bytes |

And given that a datagram is formatted as follows:

| Byte | 0 | | | | | | | | 1 | | | | | | | | 2 | | | | | | | | 3 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| bit | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 |
| 0 | Version | | | | Header Length | | | | Type Of Service | | | | | | | | Total Length | | | | | | | | | | | | | | | |
| 4 | Identification | | | | | | | | | | | | | | | | Flags | | | | Fragment Offset | | | | | | | | | | | |
| 8 | TTL | | | | | | | | Type | | | | | | | | Header Checksum | | | | | | | | | | | | | | | |
| 12 | Source IP Address | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | Destination IP Address | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Optional | IP Options (May Be Omitted) | | | | | | | | | | | | | | | | | | | | | | | | Padding | | | | | | | |
| 20 | IP Payload Data | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

And given the following frame with an encapsulated datagram:

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B4 | 40 | D0 | 8C | 71 | 7E | C7 | 41 | 93 | 46 | 22 | 84 | 08 | 00 | 45 | 49 |
| 00 | 72 | C2 | 5F | 69 | F2 | 96 | 54 | DF | 64 | 28 | A7 | 23 | CD | 9B | E1 |
| F4 | A7 | E6 | 72 | 21 | 54 | 8E | DD | 3D | 2C | 87 | 6D | 1C | AC | 50 | 2C |
| 2A | 6A | F4 | 9E | 77 | 33 | 8B | A5 | DA | 4F | E9 | 80 | DB | B4 | 6D | 03 |
| 4E | 2D | BE | F8 | F4 | 8A | 16 | CD | A2 | 77 | E8 | 82 | 51 | 04 | 04 | E5 |
| 2B | BA | 05 | 9F | 7C | C7 | 32 | E3 | 3C | A0 | AC | DB | B1 | 44 | A6 | 78 |
| F0 | 54 | 9E | F0 | C0 | DB | 48 | 89 | 43 | 21 | 09 | 5D | DF | 5E | 0C | ED |
| 5D | 8C | E6 | 09 | 92 | 4F | 68 | B1 | 05 | 90 | A9 | 84 | A7 | AF | 79 | 16 |

a. Find the destination hardware address.
b. Find the source hardware address.
c. What type of frame is this?
d. What is the Identification?
e. What Flag(s) are set in the IP header?
f. What is the fragment offset?
g. What is the TTL count?
h. What is the Header Checksum?
i. Find the source IP address.
j. What class is the source IP address?
k. What is the network ID in the source IP address?
l. What is the host ID in the source IP address?
m. Write the source IP address in dotted decimal notation.
n. Find the destination IP address.
o. What class is the destination IP address?
p. What is the network ID in the destination IP address?
q. What is the host ID in the destination IP address?
r. Write the destination IP address in dotted decimal notation.
s. If the IP header includes no options or padding, what are the first five bytes of the datagram data?
t. Can this message be delivered directly by the source to the destination, or will it require routers to handle the message. Explain.

3. Given that a frame is formatted as follows:

| Destination Hardware Address | Source Hardware Address | Frame Type | Frame Data |
|---|---|---|---|
| 6 Bytes | 6 Bytes | 2 Bytes | 46 - 1500 Bytes |

And given that a datagram is formatted as follows:

| Byte | 0 | | | | | | | | 1 | | | | | | | | 2 | | | | | | | | 3 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| bit | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 |
| 0 | Version | | | | Header Length | | | | Type Of Service | | | | | | | | Total Length | | | | | | | | | | | | | | | |
| 4 | Identification | | | | | | | | | | | | | | | | Flags | | | | Fragment Offset | | | | | | | | | | | |
| 8 | TTL | | | | | | | | Type | | | | | | | | Header Checksum | | | | | | | | | | | | | | | |
| 12 | Source IP Address | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | Destination IP Address | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Optional | IP Options (May Be Omitted) | | | | | | | | | | | | | | | | | | | | | | | | Padding | | | | | | | |
| 20 | IP Payload Data | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

And given the following frame with an encapsulated datagram:

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A6 | 5B | EC | CB | 4A | 7D | 50 | E6 | EE | 18 | BD | B0 | 08 | 00 | 45 | 73 |
| 00 | 72 | 44 | 2B | 68 | 17 | 34 | 18 | BF | EC | 84 | 1A | 25 | 75 | C9 | F1 |
| 0D | AA | 24 | 08 | 2C | 1B | A2 | C4 | CF | 29 | 49 | 37 | C0 | BE | 83 | 72 |
| E1 | 95 | 98 | 35 | F6 | C7 | 95 | 8D | D1 | 19 | B3 | 45 | C5 | E9 | 7D | 02 |
| 80 | 81 | 54 | 72 | 24 | AD | 3E | 05 | 0C | 3B | A0 | 0D | 84 | 6B | 66 | 20 |
| 62 | 8B | 0A | EC | FF | D7 | 75 | 3A | 38 | 2F | 2D | 88 | DF | 4C | D2 | C5 |
| 6D | 42 | 8D | 1B | 9C | F2 | 47 | E0 | FD | 12 | 7F | 85 | DC | 85 | F7 | C8 |
| F0 | 4C | E0 | 77 | 96 | 8F | D0 | 30 | 2D | 93 | DC | EC | 8C | CB | 0B | EA |

a. Find the destination hardware address.
b. Find the source hardware address.
c. What type of frame is this?
d. What is the Identification?
e. What Flag(s) are set in the IP header?
f. What is the fragment offset?
g. What is the TTL count?
h. What is the Header Checksum?
i. Find the source IP address.
j. What class is the source IP address?
k. What is the network ID in the source IP address?
l. What is the host ID in the source IP address?
m. Write the source IP address in dotted decimal notation.
n. Find the destination IP address.
o. What class is the destination IP address?
p. What is the network ID in the destination IP address?
q. What is the host ID in the destination IP address?
r. Write the destination IP address in dotted decimal notation.
s. If the IP header includes no options or padding, what are the first five bytes of the datagram data?
t. Can this message be delivered directly by the source to the destination, or will it require routers to handle the message. Explain.

4. Given that a frame is formatted as follows:

| Destination Hardware Address | Source Hardware Address | Frame Type | Frame Data |
|---|---|---|---|
| 6 Bytes | 6 Bytes | 2 Bytes | 46 - 1500 Bytes |

And given that a datagram is formatted as follows:

| Byte | 0 | | | | | | | | 1 | | | | | | | | 2 | | | | | | | | 3 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| bit | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 |
| 0 | Version | | | | Header Length | | | | Type Of Service | | | | | | | | Total Length | | | | | | | | | | | | | | | |
| 4 | Identification | | | | | | | | | | | | | | | | Flags | | | | Fragment Offset | | | | | | | | | | | |
| 8 | TTL | | | | | | | | Type | | | | | | | | Header Checksum | | | | | | | | | | | | | | | |
| 12 | Source IP Address | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | Destination IP Address | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Optional | IP Options (May Be Omitted) | | | | | | | | | | | | | | | | | | | | | | | | Padding | | | | | | | |
| 20 | IP Payload Data | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

And given the following frame with an encapsulated datagram:

| F6 | 4E | 70 | 0E | 05 | 81 | D2 | F4 | 58 | A5 | E8 | 8E | 08 | 00 | 45 | 92 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00 | 72 | 65 | 3A | 64 | FC | B6 | B9 | 19 | 7B | 1B | 5E | 3D | E8 | 82 | 7B |
| 8E | 54 | 11 | E3 | 16 | F4 | CA | 4E | 89 | F1 | 63 | AD | 7C | F0 | 9F | D7 |
| AF | F2 | B2 | DE | CB | CC | 30 | 33 | 91 | 4C | A2 | 7D | 34 | 0F | 03 | 81 |
| 41 | 84 | 0B | B4 | 20 | 82 | B7 | FE | 6A | 30 | 85 | 23 | 94 | 83 | 1A | F0 |
| 62 | 61 | FC | E2 | BC | 3D | 40 | E1 | 76 | F3 | 05 | 76 | 5D | D7 | 2C | B0 |
| B8 | 2D | 74 | B4 | D3 | 17 | 67 | 0F | C0 | DE | 29 | DF | 7E | F6 | DE | 79 |
| 99 | 4E | A2 | 37 | 84 | C3 | 75 | BC | 02 | 49 | 98 | 8F | 3D | 8B | 98 | A1 |

a. Find the destination hardware address.
b. Find the source hardware address.
c. What type of frame is this?
d. What is the Identification?
e. What Flag(s) are set in the IP header?
f. What is the fragment offset?
g. What is the TTL count?
h. What is the Header Checksum?
i. Find the source IP address.
j. What class is the source IP address?
k. What is the network ID in the source IP address?
l. What is the host ID in the source IP address?
m. Write the source IP address in dotted decimal notation.
n. Find the destination IP address.
o. What class is the destination IP address?
p. What is the network ID in the destination IP address?
q. What is the host ID in the destination IP address?
r. Write the destination IP address in dotted decimal notation.
s. If the IP header includes no options or padding, what are the first five bytes of the datagram data?
t. Can this message be delivered directly by the source to the destination, or will it require routers to handle the message. Explain.