In [1]:
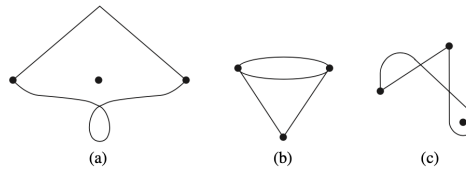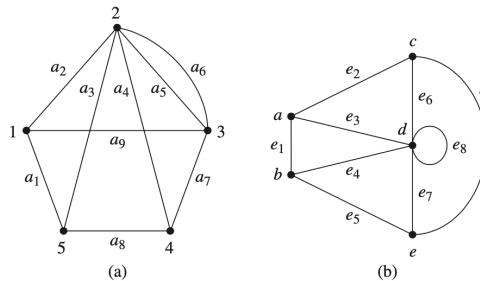```
CSCI-3080 Discrete Structure
OLA 4: Chapter 6 -- Graphs and Trees
Name:
Student ID:
Date:
```

## 1. Which of the following graphs is not isomorphic to the others, and why? (5 points)
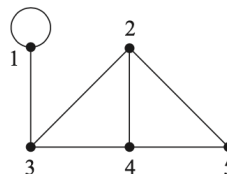


(a)          (b)          (c)

In [ ]:

## 2. Decide if the two graphs are isomorphic. If so, give the function or functions that establish the isomorphism; if not, explain why. (5 points)



(a)                          (b)

In [ ]:

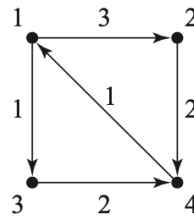## 3. Write the adjacency matrix for the given graph. (10 points)



In [ ]:

## 4. Draw the **weighted** graph represented by the following adjacency matrix. (10 points)

$$\begin{pmatrix} 0 & 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 2 \\ 0 & 0 & 0 & 0 & 2 & 0 \end{pmatrix}$$

In [ ]:

## 5. Write the adjacency list representation for the given <span style="color:red">weighted</span> directed graph. (10 points)



In [ ]:

## 6. Please draw the expression tree for the following algebraic expression: (20 points)

$[(x - 2) * 3] + (5 + 4)$

1. Please draw the expression binary tree (5 points)
2. Write the list of nodes resulting from a **preorder** traversal, an **inorder** traversal, and a **postorder** traversal of the given tree (15 points)

In [ ]:

## 7. Given the codes: (10 points)

| character | b | h | q | w | % |
|-----------|------|------|---|----|-----|
| encoding | 1000 | 1001 | 0 | 11 | 101 |

(1) decode the sequence 10001001101101
(2) decode the sequence 11110
(3) decode the sequence 01001111000

In [ ]:

## 8. (30 points)

| Character | ? | x | w | e | t | s | a |
|-----------|----|---|----|----|----|----|---|
| Frequency | 14 | 3 | 11 | 27 | 18 | 22 | 5 |

(1) Please construct the Huffman tree for the above characters and frequencies. (10 points)

(2) Please find the Huffman codes for these characters. (10 points)

(3) A file consisting of 100,000 instances of these seven characters is stored using a fixed-length binary encoding scheme. How many bits are required for each code and what is the toal number of bits needed? (5 points)

(4) Storing the same file using the Huffman code in (2), how many bits are needed? (5 points)

In [ ]:

In [ ]: