Mod 13

13.1.1

a. m, n, i, p

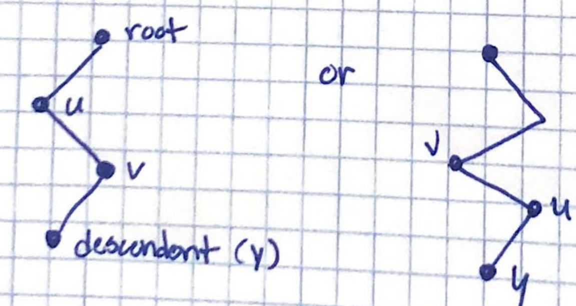
b. f, g, e, d, a, b, c

c. j, q, n, e, a, b, c, g

d. if p is level 0, d is level $\boxed{3}$

13.1.3

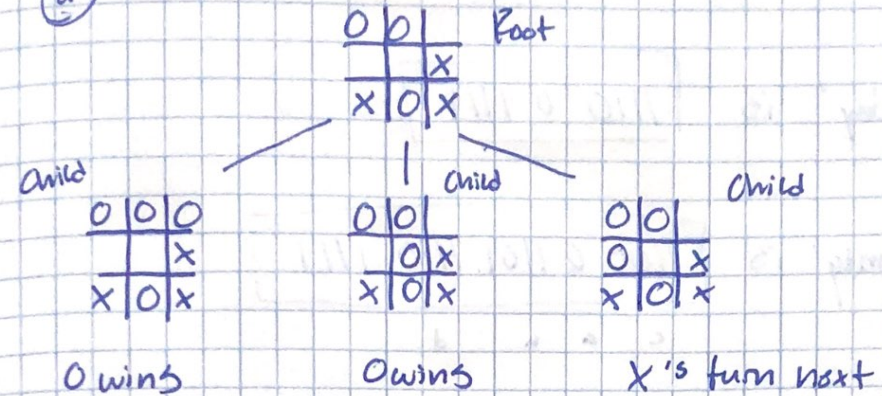
a.



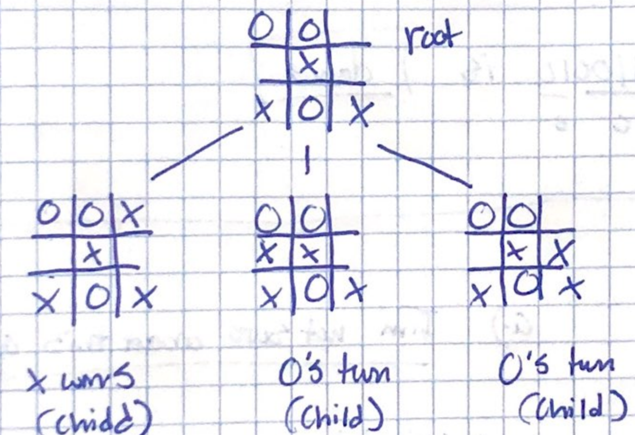
y has a unique path then u and v must be on that path. thus, u is a descendant of v or vice versa.

13.2.1

(a.)


Root
Child
Child
Child
O wins
O wins
X's turn next

(b.)


root
X wins
(child)
O's turn
(Child)
O's turn
(Child)

13.2.2

a.) 'day' is $\boxed{1110\ 0\ 1111}$

b.) 'candy' is $\boxed{1100\ 0\ 1101\ 1110\ 1111}$

c a n d

c.) 1110101101 is $\boxed{\text{den}}$

d.) $\underset{d}{\underline{1110}}\underset{a}{\underline{0}}\underset{n}{\underline{1101}}\underset{c}{\underline{1100}}\underset{e}{\underline{10}}$ is $\boxed{\text{dance}}$

13.2.3

	bits
a :	2
b :	2
c :	3
d :	3
e :	3
f :	3

a.) I'm not sure about this question *

- weighted avg. =

$$\frac{2(.05) + 2(.05) + 3(.1) + 3(.15) + 3(.25) + 3(.4)}{1}$$

$\boxed{= 2.9}$

- normal average

$(2 + 2 + 3 + 3 + 3 + 3)/6 = \boxed{2.66}$

13.2.3

(b.) No tree would result in fewer bits

13.3.1

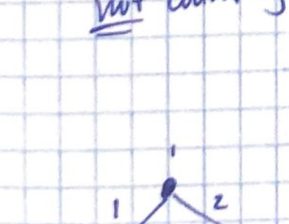
(a.) There is no tree w/ 7 vertices and total degree 14

each vertex must have a degree of 2 but

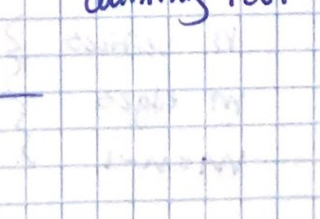
7 is odd. or $\sum \deg(v) = 2 \cdot |E| = 2 \cdot |6| = 12 \neq 14$

(b.)

(c.)



or



not counting root

counting root

(d.)

13.3.2

(a.)

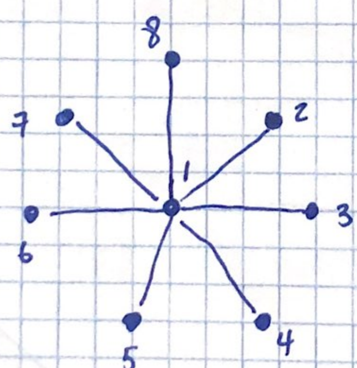
$n=1$ 1 leaf

$n=2$ 2 leaves

$n=3$ 2 leaves

$\boxed{\text{For } n \geq 3 \text{ most leaves } = n-1}$

(b.)



$n-1$

$= 8-1 = 7$ leaves

13.3.3

(a.)

$\left.\begin{array}{l} n \text{ vertices} \\ m \text{ edges} \\ m = n-1 \end{array}\right\}$ graph is a tree

Converse: m edges then $n = m+1 \Rightarrow m = n-1$

So <u>Yes</u>

$\boxed{13.3.5}$

We know that for a connected graph

$\cancel{m = n-1}$ where m = edges and n = vertices

$m \geq n-1$

m can be equal to or greater than $n-1$

$n = 3$
$m = n-1 = 2$
$m = n-1$

$n = 4$
$m = 4$
$m \geq n-1$

$\therefore$ if $m < n-1$ you will have a disconnect

somewhere $\rightarrow \bullet \leftarrow$

try to create a connected graph w/ the two examples above using $m < n-1 \Rightarrow m = n-2$

13.4.1

a. Posorder: f, i, h, e, b, g, c, a, d

b. Preorder: d, f, b, i, h, e, a, c, g