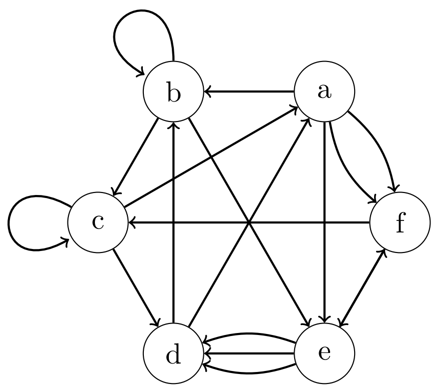
2

a) Incident matrix

	e_1	e_2	e_3	e_4	e_5	e_6	e_7	e_8	e_9
v_1	1	0	1	0	0	0	0	0	0
v_2	0	1	0	1	0	0	0	0	0
v_3	1	1	0	0	0	0	1	1	1
v_4	0	0	1	0	1	0	1	0	0
v_5	0	0	0	0	1	1	0	0	1
v_6	0	0	0	1	0	1	0	1	0

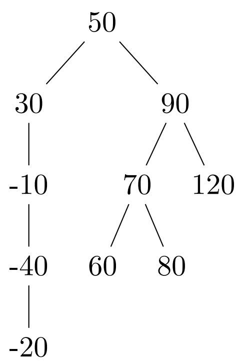
b) {a, b, f}, {c, d, e, g, h}

c) Graph from the given adjacencty matrix:

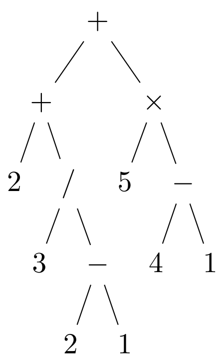


3

a) Binary search tree:



b) i. Ordered rooted tree of the given expression:



ii. Prefix expression:

$$(+ \quad (+ \quad 2 \quad (/ \quad 3 \quad (- \quad 2 \quad 1))) \quad (\times \quad 5 \quad (- \quad 4 \quad 1)))$$

Evaluating the expression:

$$\begin{aligned}
&= (+ \quad (+ \quad 2 \quad (/ \quad 3 \quad 1)) \quad (\times \quad 5 \quad 3)) \\
&= (+ \quad (+ \quad 2 \quad 3) \quad 15) \\
&= (+ \quad 5 \quad 15) \\
&= 20
\end{aligned}$$

c) The number of edges in a ful m-ary tree with i internal vertices is $m \times i$. Therefore, in a full 3-ary tree with 24 internal vertices the number of edges $= 3 \times 24 = 72$.

4

a)

$$\begin{aligned}
n &= 20 \\
k &= 64 \\
N &=? \\
\left\lceil \frac{N}{k} \right\rceil &= n \\
\left\lceil \frac{N}{64} \right\rceil &= 20 \\
\text{minimum} \quad N &= 1217
\end{aligned}$$

b) i. Total numof arrangements - numof arrangements where ‘T’ s are together.

$$\frac{9!}{2!} - 8!$$

ii. 4 vowels, 4! ways to permute among themselves; two ‘T’ s.

$$\frac{6! \times 4!}{2!}$$

iii. 5 consonants, $\frac{5!}{2!}$ ways to permute among themselves because two ‘T’ s.

$$5! \times \frac{5!}{2!}$$

c) v c v c v c v $\rightarrow 5^4 \times 21^3$
c v c v c v c $\rightarrow 5^3 \times 21^4$
total = sum