

CS2 101 10-13-20

1

- Pa1 extended $\geq$ more days
- quiz1 today

Exercise

write a client function with
heading

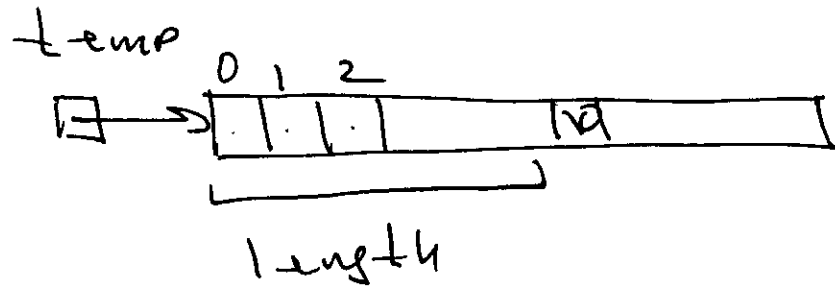
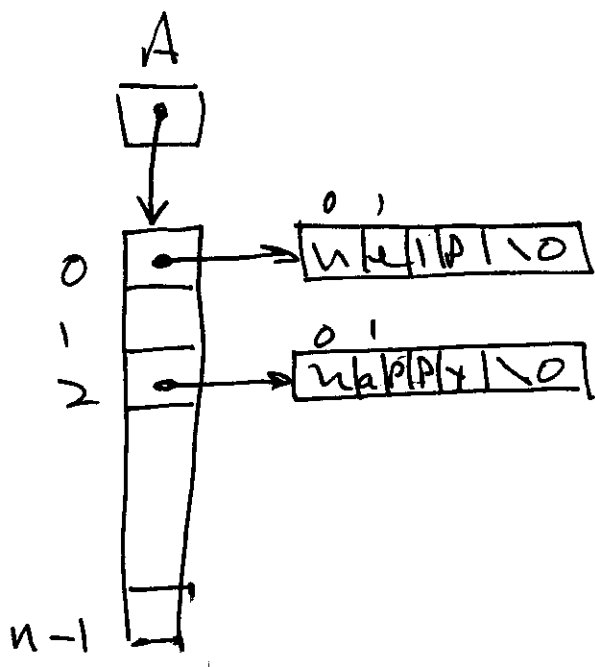
```
void cleanup(List L){  
    :
```

```
}
```

that deletes all duplicates
in L.

Pa1 stull.

string arrays in C

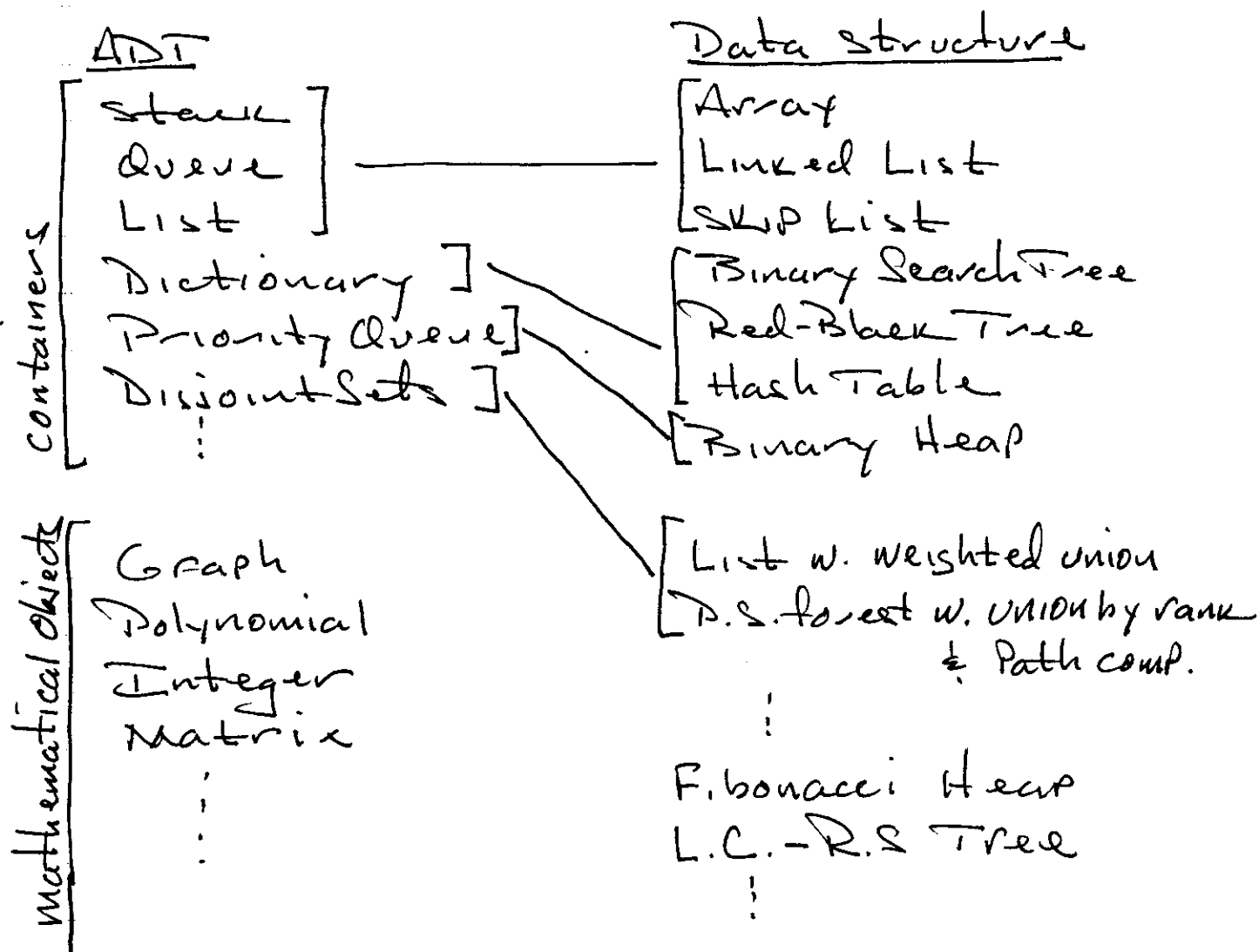


wrong: $A[i] = temp$. ~~X~~!!!

right: $A[i] = \text{calloc}(length, \text{sizeof char})$
 $\text{strcpy}(A[i], temp)$

ADTs vs. Data structures

3



Graphs

A graph is an ordered pair of sets

$$G = (V, E)$$

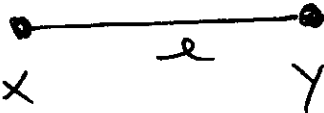
$\uparrow$ $\uparrow$
 vertex Edge
 set set

where $V \neq \emptyset$ and

$$E \subseteq V^{(2)} = \{2\text{-element subsets of } V\}$$

i.e. $x, y \in V$, we may have $\{x, y\} \in E$

Picture $\{x, y\}$ or xy or e



We say: x is adjacent to y

x is incident with $\{x, y\} = e$

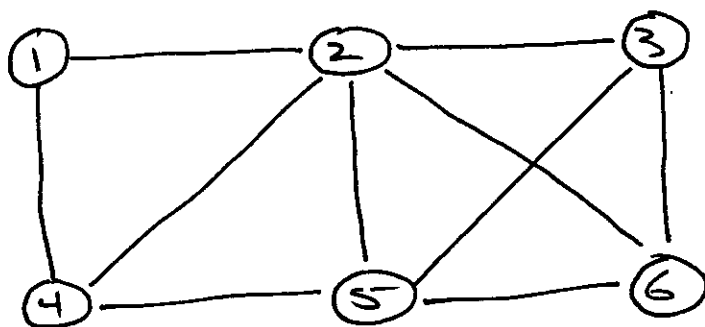
x & y are the ends of e

$e = \{x, y\}$ joins x and y

Ex.

$$V = \{1, 2, 3, 4, 5, 6\}$$

$$E = \{12, 14, 23, 24, 25, 35, 36, 45, 56, 26\}$$



$$\deg(3) = 3$$

$$\deg(1) = 2$$

$\deg(x) = \# \text{ vertices adjacent to } x$
 $= \# \text{ edges incident with } x$

Ex.

①

②

$$V = \{1, 2, 3, 4\}$$

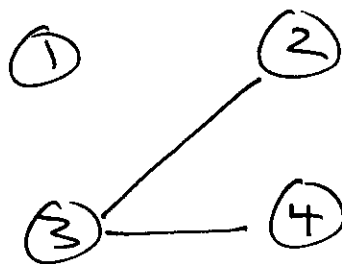
③

④

$$E = \emptyset$$

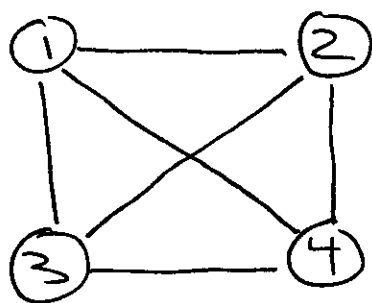
Ex

$$\deg(1) = 0$$



$$V = \{1, 2, 3, 4\}$$

$$E = \{23, 34\}$$

Ex. K_4 

$$|V(K_4)| = 4$$

$$|E(K_4)| = 6$$

complete graph on 4 vertices

of (labeled) graphs on 4 vertices

$$= 2^6$$

Question:

how many Graphs on n vertices are there.

Answer: $2^{|E(K_n)|} = 2^{\frac{n(n-1)}{2}}$

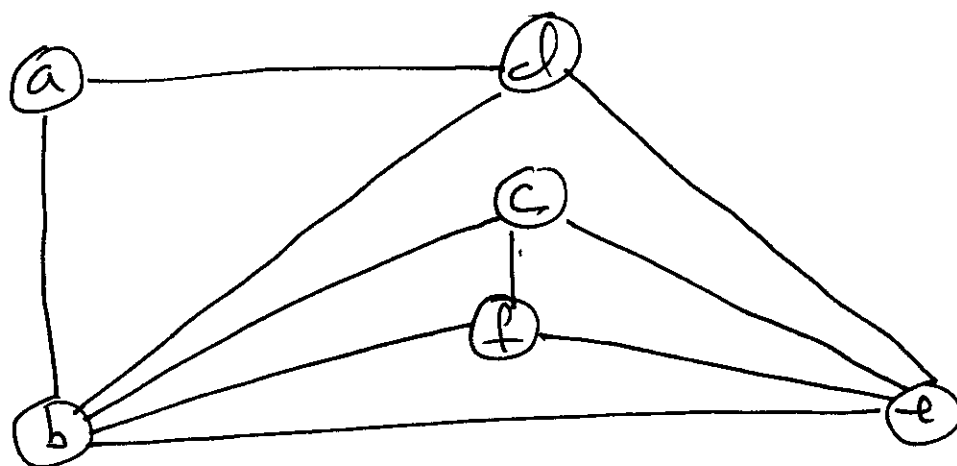
what is $|E(K_n)| = \binom{n}{2} = \frac{n(n-1)}{2}$

Answer: # of 2-subsets of $\{1, 2, \dots, n\}$
 $= C(n, 2) = \binom{n}{2}$

Ex.

$$V = \{a, b, c, d, e, f\}$$

$$E = \{ab, ad, bc, bd, be, bf, ce, cf, de, ef\}$$



This graph is isomorphic to the first example

Defn G is isomorphic to H iff there exists a bijection

$$\phi: V(G) \rightarrow V(H)$$

such that for all $x, y \in V(G)$:

$$\{x, y\} \in E(G) \iff \{\phi(x), \phi(y)\} \in E(H)$$