作業#7 讀入客戶購買記錄，利用資料探勘進行協同過濾推薦

- 找出和客戶A購買重複商品(相同商品)數量最多的客戶B(可能有多位)，把客戶B們有購買但客戶A還未購買的商品推薦給客戶A
- 請到雲端學院下載 record-01.txt 和 record-02.txt (其中record-01有以下7位客戶的購買記錄)
- 推薦結果輸出到 recommend.txt 檔案中，包括 客戶A代號 (客戶B們代號) : (推薦商品們)

執行 (load-facts "record-01.txt")
可載入record-01.txt檔案中資料
並 assert facts

(length$ $?multi) 可以傳回 $?multi
變數中值的個數來比較大小

record-01.txt

```
(sales (id C001) (items 32 5 79 2 3 91 84 14 13))
(sales (id C002) (items 91 29 30 5 64 78 14))
(sales (id C003) (items 55 14 39 28 79 30 5 2 78 13 17))
(sales (id C004) (items 6 93 2 30 78 32 7 64 39 1))
(sales (id C005) (items 39 3 32 30 29 8 79 1))
(sales (id C006) (items 16 91 14 1 6 29 79 93 88))
(sales (id C007) (items 17 2 78 5 14 3 30 22 95 91))
```

```
(deftemplate sales (slot id) (multislot items))
(deftemplate same (multislot pair) (multislot items))
(deftemplate recommend (slot id) (multislot similar) (multislot items))

(deffacts initial (phase load-data))

(defrule assert-data
  (phase load-data)
  =>
  (load-facts "record-01.txt")
  (open "recommend.txt" out "w"))
```

recommend.txt

```
C007 (C003) : (55 39 28 79 13)
C002 (C007) : (17 2 3 22 95)
C003 (C007) : (3 22 95 91)
C006 (C001 C005 C004 C002) : (39 3 32 30 8 2 78 7 64 5 84 13)
C005 (C004) : (6 93 2 78 7 64)
C004 (C003 C005) : (3 29 8 79 55 14 28 5 13 17)
C001 (C003 C007) : (17 78 30 22 95 55 39 28)
```

```
(defrule generate-recommend
  (phase load-data)
  (sales (id ?id1) (items $?))
  =>
  (assert (recommend (id ?id1) (similar) (items))))

(defrule generate-pair
  (phase load-data)
  (sales (id ?id1) (items $?))
  (sales (id ?id2&~?id1) (items $?))
  =>
  (assert (same (pair ?id1 ?id2) (items))))

(defrule generate-same-items
  (phase load-data)
  ?f <- (same (pair ?id1 ?id2) (items $?items))
  (sales (id ?id1) (items $? ?x $?))
  (sales (id ?id2) (items $? ?x $?))
  (test (not (member$ ?x $?items)))
  =>
  (modify ?f (items $?items ?x)))

(defrule change-phase-1
  (declare (salience -10))
  ?f <- (phase load-data)
  =>
  (retract ?f)
  (assert (phase find-similar)))
```

(member$?x $?items)
判斷 ?x 是否在 $?items 中
，若在則為true，反之false

```
(sales (id A) (items 4 1 3 2))
(sales (id B) (items 1 5 4 6))
(sales (id C) (items 6 2 4 3))
```

↓

```
(recommend (id A) (similar) (items))
(recommend (id B) (similar) (items))
(recommend (id C) (similar) (items))
```

↓

```
(same (pair A B) (items))
(same (pair B A) (items))
(same (pair A C) (items))
(same (pair C A) (items))
(same (pair B C) (items))
(same (pair C B) (items))
```

↓

```
(same (pair A B) (items 4 1))
(same (pair B A) (items 4 1))
(same (pair A C) (items 4 3 2))
(same (pair C A) (items 4 3 2))
(same (pair B C) (items 4 6))
(same (pair C B) (items 4 6))
```