

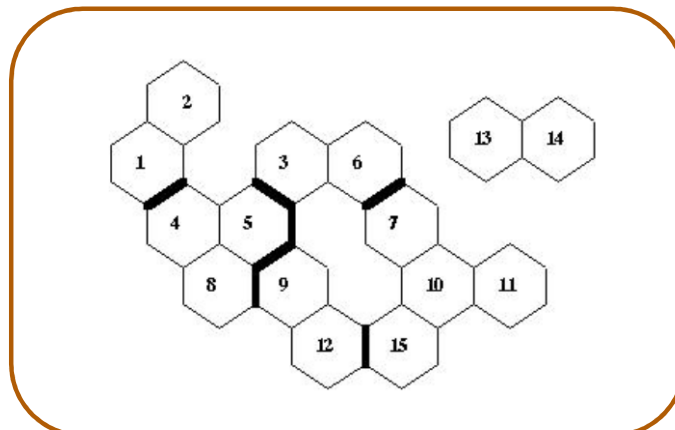
ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ

6^ο Εξάμηνο

Προβλήματα που βασίζονται σε γραφήματα
Άσκηση Πράξης 8 (DIPAETALK)

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Τμήμα Μηχανικών Πληροφορικής & Ηλεκτρονικών Συστημάτων

Παραδείγματα Γραφημάτων:
Δίκτυο τηλεφωνίας "dipaetalk"



Παραδείγματα Γραφημάτων: Δίκτυο τηλεφωνίας "dipaetalk"

% Γεωγραφικοί τομείς με τις περιοχές

region(r1, 2110, [1,2]).

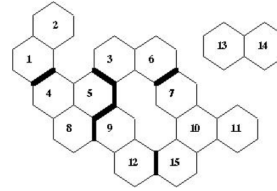
region(r2, 2210, [4,5,8]).

region(r3, 2310, [3,6]).

region(r4, 2410, [7,10,11,15]).

region(r5, 2510, [9, 12]).

region(r6, 2610, [13,14]).



Παραδείγματα Γραφημάτων: Δίκτυο τηλεφωνίας "dipaetalk"

Γράφημα Διπλανών Περιοχών

next_to(1,2).

next_to(1,4).

next_to(3,5).

next_to(3,6).

next_to(4,5).

next_to(4,8).

...

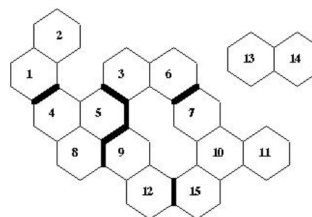
next_to(10,15).

next_to(12,15).

next_to(13,14).

connect(X,Y) :- next_to(X,Y).

connect(X,Y) :- next_to(Y,X).



Παραδείγματα Γραφημάτων:
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Τηλεφωνικός κατάλογος

```
telephone(2310-6-64221, name(andriopoulos, nikos)).
telephone(2110-2-49037, name(papadakis, giwrgos)).
telephone(2410-11-5829, name(georgiou, evaggelos)).
telephone(2510-12-4234, name(parantoniou, kiki)).
...
telephone(2610-14-7270, name(antoniou, eleni)).
```

Παραδείγματα Γραφημάτων:
Δίκτυο τηλεφωνίας "dipaetalk"

```
region(r1, 2110, [1,2]).
region(r2, 2210, [4,5,8]).
...
telephone(2310-6-64221, name(andriopoulos, nikos)).
telephone(2110-2-49037, name(papadakis, giwrgos)).
...

which_region_area(Code-Area-_, Sector, Area) :-
    region(Sector, Code, AreaList),
    member(Area, AreaList).

same_region(Area1, Area2) :-
    region(_, _, AreaList),
    member(Area1, AreaList),
    member(Area2, AreaList).
```

Παραδείγματα Γραφημάτων: Δίκτυο τηλεφωνίας "dipaetalk"

Εύρεση Μονοπατιού (διαδρομή χωρίς κύκλους)

```
pathNoLoop(AreaStart, AreaEnd, Visited, [AreaStart, AreaEnd]) :-
```

```
  connect(AreaStart, AreaEnd),
  not(member(AreaEnd, Visited)).
```

```
pathNoLoop(AreaStart, AreaEnd, Visited, [AreaStart|PathNextToEnd]) :-
```

```
  connect(AreaStart, AreaNext),
  not(member(AreaNext, Visited)),
  pathNoLoop(AreaNext, AreaEnd, [AreaNext|Visited], PathNextToEnd).
```

ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ

6ο ΕΞΑΜΗΝΟ

Παραδείγματα Γραφημάτων: Δίκτυο τηλεφωνίας "dipaetalk"

Εύρεση Μονοπατιού (διαδρομή χωρίς κύκλους)

?- pathNoLoop(1, 5, [1],).

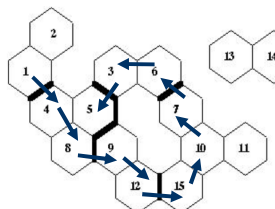
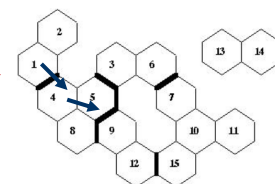
Path = [1, 4, 5] ;

Path = [1, 4, 8, 5] ;

Path = [1, 4, 8, 9, 5] ;

Path = [1, 4, 8, 9, 12, 15, 10, 7, 6, 3, 5] ;

false



ΤΕΧΝΗΤΗ ΝΟΗΜΟΣΥΝΗ

6ο ΕΞΑΜΗΝΟ

Παραδείγματα Γραφημάτων:
Δίκτυο τηλεφωνίας "dipaetalk"

Εύρεση Μονοπατιού (διαδρομή χωρίς κύκλους)

?- pathNoLoop(1, 11, [1], Path).

Path = [1, 4, 5, 8, 9, 12, 15, 10, 11] ;

Path = [1, 4, 5, 9, 12, 15, 10, 11] ;

Path = [1, 4, 5, 3, 6, 7, 10, 11] ;

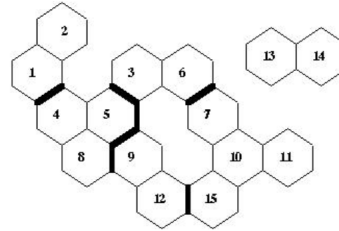
Path = [1, 4, 8, 9, 12, 15, 10, 11] ;

Path = [1,4,8,9,5,3,6,7,10,11]

Path = [1, 4, 8, 5, 9, 12, 15, 10, 11] ;

Path = [1, 4, 8, 5, 3, 6, 7, 10, 11] ;

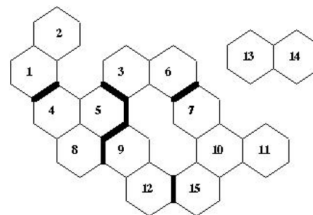
false



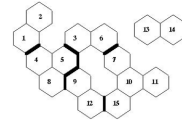
Παραδείγματα Γραφημάτων:
Δίκτυο τηλεφωνίας "dipaetalk"

cost(Area1, Area2, **0**):-
 same_region(Area1, Area2).

cost(Area1, Area2, **1**):-
 not(same_region(Area1, Area2)).



Παραδείγματα Γραφημάτων:
Δίκτυο τηλεφωνίας "dipaetalk"



Εύρεση Μονοπατιού με το αντίστοιχο κόστος

```

pathCost(AreaStart, AreaEnd, Visited, [AreaStart, AreaEnd], Cost) :-
    connect(AreaStart, AreaEnd),
    not(member(AreaEnd, Visited)),
    cost(AreaStart, AreaEnd, Cost).

pathCost(AreaStart, AreaEnd, Visited, [AreaStart|PathNextToEnd], FinalCost) :-
    connect(AreaStart, AreaNext),
    not(member(AreaNext, Visited)),
    cost(AreaStart, AreaNext, Cost),
    pathCost(AreaNext, AreaEnd, [AreaNext|Visited], PathNextToEnd,
              CostNextToEnd),

FinalCost is Cost+CostNextToEnd.

```

Παραδείγματα Γραφημάτων:
Δίκτυο τηλεφωνίας "dipaetalk"

```

can_call(Name1, Name2, Route) :-
    telephone(_-Area1-, name(Name1,_)),
    telephone(_-Area2-, name(Name2,_)),
    pathNoLoop(Area1, Area2, [Area1], Route).

can_call(Name1, Name2, Route, Cost) :-
    telephone(_-Area1-, name(Name1,_)),
    telephone(_-Area2-, name(Name2,_)),
    pathCost(Area1, Area2, [Area1], Route, Cost).

```

Παραδείγματα Γραφημάτων:
Δίκτυο τηλεφωνίας "dipaetalk"

```

can_call(Name1, Name2, Route, Cost) :-
    telephone(_-Area1-_, name(Name1,_)),
    telephone(_-Area2-_, name(Name2,_)),
    pathBestCost(Area1, Area2, Route, Cost).

pathBestCost(AreaStart, AreaEnd, FinalPath, BestCost):-
    setof( (Cost, Path),
        pathCost(AreaStart, AreaEnd, [AreaStart], Path, Cost),
        [(BestCost, FinalPath)]_Rest).

```

Παραδείγματα Γραφημάτων:
Δίκτυο τηλεφωνίας "dipaetalk"

```

dipaetalk :-
    write('*** Welcome to DIPAETALK ***'), nl, nl,
    dipae_talk.

dipae_talk :-
    write('Choose one of the following services:'), nl,
    write('1. Verify Direct Connection of Two Areas. '), nl,
    write('2. Find Region and Area of a Telephone Number'), nl,
    write('3. Find Route of a specific call with minimum cost'), nl,
    write('4. Exit. '), nl,
    read(Choice),
    write(' Your Choice -> '), write(Choice), nl,
    execute(Choice).

```

Παραδείγματα Γραφημάτων:
Δίκτυο τηλεφωνίας "dipaetalk"

```
execute(1) :-  
    write('Give Area 1 --> '),  
    read(Area1),  
    write('Give Area 2 --> '),  
    read(Area2),  
    connect(Area1, Area2), !,  
    write('*** Areas are directly connected ***'), nl, nl,  
    dipae_talk.
```

```
execute(1) :-  
    write('*** Areas are Not next to each other ***'), nl, nl,  
    dipae_talk.
```

Παραδείγματα Γραφημάτων:
Δίκτυο τηλεφωνίας "dipaetalk"

```
execute(2) :-  
    write('Give phone number --> '),  
    read(Code-Area-Number),  
    telephone(Code-Area-Number,_,!),  
    which_region_area(Code-Area-_, Region, Area),  
    write('*** Number is in Region: '), write(Region),  
    write(' - Area: '), write(Area), write(' ***'), nl, nl,  
    dipae_talk.
```

```
execute(2) :-  
    write('*** The phone number does not exist! ***: '), nl, nl,  
    dipae_talk.
```


**Παραδείγματα Γραφημάτων:
Δίκτυο τηλεφωνίας "dipaetalk"**

```
execute(3) :-  
    write('Give me your name: '),  
    read(Name1),  
    write('Give the name of the person you are calling: '),  
    read(Name2),  
    can_call(Name1, Name2, Route, Cost),!,  
    write('*** calling *** '),  
    write('Route: '), write(Route), nl,  
    write('Cost: '), write(Cost), write('€'), nl, nl,  
    dipae_talk.  
  
execute(3) :-  
    write('*** call failed ***'), nl, nl,  
    dipae_talk.
```

**Παραδείγματα Γραφημάτων:
Δίκτυο τηλεφωνίας "dipaetalk"**

```
execute(4) :-  
    write('*** Thanks for using DIPAETALK ***'), nl, nl.  
  
execute(_Exception) :-  
    write('*** No such service! How can we help you ***'),  
    nl, nl,  
    dipaetalk.
```