January 2010

Computer Science Competition

Judges Packet

Problem #1
60 Points

The Onion

Test Input File
None

Test Output To Screen
```
NASA Baffled by Failure of Straw Shuttle
McDonald's Stock Slides as More Consumers Turn to Food
Thomas Edison Invents Marketing Other People's Ideas
Scientists Abandon AI Project after Seeing The Matrix
Bush On Economy: 'Saddam Must Be Overthrown'
```

Problem #2
60 Points

Amortization

Test Input File

```
10
360 5 100000 .005
240 239 1000000 .03
564 324 1234567 .0083
12 12 10000 .007
480 480 7464269 0.0021
132 18 3192748 0.05
192 142 82199 0.0060
888 260 3475613 0.073
588 182 1043 0.0080
696 85 2768006 0.0015
```

Test Output To Screen

```
$99497.24
$29150.41
$1074910.65
$0.00
$0.00
$3185569.27
$31116.82
$3475613.00
$1011.28
$2563415.18
```

Problem #3
60 Points

City Paths

Test Input File

```
11
59th St and 7th Ave to 62nd St and 5th Ave
15th St and 14th Ave to 1st St and 2nd Ave
61st St and 29th Ave to 53rd St and 32th Ave
99th St and 99th Ave to 99th St and 86th Ave
15th St and 15th Ave to 1st St and 1st Ave
2nd St and 1st Ave to 3rd St and 6th Ave
47th St and 20th Ave to 59th St and 11th Ave
4th St and 84th Ave to 4th St and 87th Ave
60th St and 47th Ave to 66th St and 54th Ave
3rd St and 99th Ave to 14th St and 90th Ave
28th St and 70th Ave to 25th St and 59th Ave
```

Test Output To Screen

```
10
9657700
165
1
40116600
6
293930
1
1716
167960
364
```

Problem #4
60 Points

Floating Bases

Test Input File

```
11
01000000000010010010000111111011010101000100010000101101000110000
11000000000100001100110011001100110011001100110011001100110011001101
01000001011001101111000111011010110011111101110011000110001111111
01000000000001011011111100001010100010110000010010010001100110111
00111111111000100111100010001100111111000110111111011011000011001
00111111111011010100111110010111000100111110100000010011010111101
00111111111100110011101110100000000001001111000000000110001000001
11000000001110000000000000000000000000000000000000000000000000000000
01000000100111110111000011001110000011001010010110101010110010010
11000000010100110110101000111101011100001010001111010111000010010
11000001001011100011000000000100011000001101100111000001101101111
```

Test Output To Screen

```
3.14
-4.20
12029654.50
2.72
0.58
0.92
1.20
-24.00
2012.20
-77.66
-989186.19
```

Problem #5
60 Points

Dishes

Test Input File – The long strings are all on one line in the file.

```
6
2 ABA
A 1 2
B 2 1
5
3 ABAC
A 1 2
B 2 1
C 8 2
10
3 ABABBABBABABABABBABCABABBBBAABCABBABCBACBC
A 7 4
B 6 5
C 2 8
8
5
EDCBCBDAEDCADECDABDECBDEAEAEDECDBCADBACBCDBCDAEEAEEAEAEBCADBCDADBCBDEADEDEABD
CEADEEDDEBAEADEAEDBCDBACDCBBCBCBCADEDEAEDAEAAEEEDCDBCDBDBAEC
A 19 5
B 2 1
C 7 3
D 4 15
E 6 25
12
3 ABC
A 1 2
B 3 4
C 5 6
2
26
QWERTYUIOPALSKDJFHGMZNXBCVFGVDGSFUIGBWEIOQGFUILBVPPVBUBBZBVQFKEHNFJQBHFUIHWQE
FHQPWEFUPEYWRFUHQWEUXMQZZKXNXLJAAMKAXLNKLANSVCVCBKKJQJHQWEFHHIASDFPHEWPUPFPQB
JJSDKAFBHASJKFHAEWFHWWGVBVBNSMXZJGWFDREWFRHQOPUPQOQHLALFDHASLC
A 8 5
B 5 7
C 1 2
D 3 7
E 19 15
F 15 13
G 17 25
H 26 19
I 18 37
J 26 105
K 7 2
L 20 20
M 9 14
N 18 22
O 5 6
P 7 9
Q 12 106
```

```
R 9 12
S 14 7
T 8 2
U 4 19
V 108 26
W 1 1
X 2 2
Y 3 3
Z 25 25
22
```

Test Output To Screen

```
2 clearers 3 cleaners: 3.67
6 clearers 4 cleaners: 3.75
4 clearers 4 cleaners: 114.25
5 clearers 7 cleaners: 421.71
1 clearers 1 cleaners: 21.00
10 clearers 12 cleaners: 759.62
```

Problem #6
60 Points

Tagging

Test Input File

```
8
"Pantif      Tirt" "Tannep Tatt" "I Lete yey" "a madness most discrete"
"L-a+u*n/eM" "L e u r e ''m" "Tannep Tatt" "a lice bparklung" "Launem"
"Cavi es a dmeke" "Ceired by mho cames" "feang bargid"
"Launem" "Tannep Tatt" "a   liCe   bparkLung" "LAuNem" "a lice bpar5klung"
"in loved's eyas" "Launem" "being vomad" "Tannep Tatt" "Pantif Tirt"
"a hea fiedishid by" "a choking gall" "a preserving sweet" "lover's sears"
"what is ;!@#$%^&*(else" "Tannep Tatt" "in loved's eyas" "Cavi es a dmeke" "a
mad,ness most discrete!"
"a choking gall" "Tannep Tatt" "a PRESERVING sweet" "Pantif Tirt"
```

Test Output To Screen

```
"tanneptatt" 6
"launem" 5
"pantiftirt" 3
"achokinggall" 2
"alicebparklung" 2
"amadnessmostdiscrete" 2
"apreservingsweet" 2
"caviesadmeke" 2
"inlovedseyas" 2
"aheafiedishidby" 1
"alicebpar5klung" 1
"beingvomad" 1
"ceiredbymhocames" 1
"feangbargid" 1
"ileteyey" 1
"leurem" 1
"loverssears" 1
"whatiselse" 1
```

Problem #7
60 Points

PHP

Test Input File

```
11
314
3.14
FOURTHFRENCH
3.0.0
sometext
12029654
22.598
1556100.00981500
H.5
5.5.5
45611a
```

Test Output To Screen

```
integer
decimal
string
string
string
integer
decimal
decimal
string
string
string
```

Problem #8
60 Points

Significant Digits

Test Input File

```
8
3.14
1001.1
0.001202965400000
100000.000002
10.001202965400000
0000500.10
0000000.0000001
12029654.00000
```

Test Output To Screen

```
8
3.14
1001.1
0.001202965400000
100000.000002
10.001202965400000
0000500.10
0000000.0000001
12029654.00000
```

Problem #9
60 Points

Connections

Test Input File

```
4
4 3
A B C D
A-B
C-A
D-B
9 10
Xavier Louis George Brittney Doug Jason Sushmitha Petra Yinfei
Xavier-Louis
Louis-George
George-Xavier
Petra-Sushmitha
Brittney-Doug
Brittney-Xavier
Xavier-Petra
Jason-Yinfei
Jason-Louis
Xavier-Sushmitha
7 8
A B C D E F G
A-C
B-F
G-F
D-C
B-A
E-F
F-A
B-C
25 40
Acacia AlphaEpsilonPhi AlphaTauOmega BetaThetaPi ChiPhi DeltaChi
DeltaSigmaPhi DeltaTauDelta KappaAlphaOrder KappaSigma LambdaChiAlpha
PhiDeltaTheta PhiGammaDelta PhiKappaPsi PiKappaAlpha PiKappaPhi
SigmaAlphaEpsilon SigmaAlphaMu SigmaChi SigmaPhiEpsilon SigmaPi
TauKappaEpsilon ThetaChi ZetaBetaTau ZetaPsi
DeltaSigmaPhi-DeltaSigmaPhi
Acacia-LambdaChiAlpha
SigmaAlphaEpsilon-AlphaTauOmega
Acacia-ChiPhi
PiKappaAlpha-SigmaAlphaMu
SigmaChi-Acacia
PiKappaPhi-TauKappaEpsilon
Acacia-DeltaChi
Acacia-SigmaPhiEpsilon
ZetaPsi-DeltaChi
Acacia-TauKappaEpsilon
AlphaEpsilonPhi-ChiPhi
SigmaAlphaMu-SigmaAlphaEpsilon
BetaThetaPi-PiKappaPhi
PhiGammaDelta-Acacia
PhiDeltaTheta-KappaSigma
TauKappaEpsilon-AlphaTauOmega
DeltaTauDelta-ThetaChi
```

Problem #9
60 Points

Connections

Test Input File cont.

```
SigmaAlphaMu-SigmaPhiEpsilon
PiKappaAlpha-AlphaEpsilonPhi
ThetaChi-KappaAlphaOrder
ChiPhi-BetaThetaPi
ChiPhi-PiKappaPhi
ChiPhi-ThetaChi
DeltaSigmaPhi-LambdaChiAlpha
KappaSigma-SigmaPi
PhiDeltaTheta-DeltaSigmaPhi
KappaSigma-BetaThetaPi
SigmaPhiEpsilon-SigmaChi
SigmaAlphaEpsilon-DeltaTauDelta
AlphaEpsilonPhi-SigmaChi
ZetaBetaTau-ZetaBetaTau
SigmaAlphaMu-ChiPhi
SigmaPhiEpsilon-ZetaPsi
PiKappaPhi-ZetaBetaTau
PiKappaPhi-PhiGammaDelta
SigmaPi-ThetaChi
AlphaEpsilonPhi-SigmaPhiEpsilon
DeltaTauDelta-KappaSigma
SigmaAlphaMu-LambdaChiAlpha
PhiGammaDelta-ThetaChi
KappaSigma-ChiPhi
ZetaPsi-SigmaAlphaMu
TauKappaEpsilon-ZetaPsi
SigmaPhiEpsilon-DeltaSigmaPhi
SigmaPi-DeltaSigmaPhi
SigmaPhiEpsilon-BetaThetaPi
BetaThetaPi-ZetaPsi
ZetaBetaTau-SigmaAlphaEpsilon
TauKappaEpsilon-PhiGammaDelta
SigmaChi-LambdaChiAlpha
SigmaAlphaMu-AlphaTauOmega
PhiKappaPsi-ThetaChi
PhiGammaDelta-ChiPhi
PhiKappaPsi-DeltaTauDelta
```

Test Output To Screen

```
1 1 1 0
1 1 0 1
1 0 1 0
0 1 0 1

1 1 1 1 0 0 1 1 0
1 1 1 0 0 1 0 0 0
1 1 1 0 0 0 0 0 0
1 0 0 1 1 0 0 0 0
0 0 0 1 1 0 0 0 0
0 1 0 0 0 1 0 0 1
1 0 0 0 0 0 1 1 0
1 0 0 0 0 0 1 1 0
0 0 0 0 0 1 0 0 1
```

Problem #9
60 Points

Connections

Test Output File cont.

```
1 1 1 0 0 1 0
1 1 1 0 0 1 0
1 1 1 1 0 0 0
0 0 1 1 0 0 0
0 0 0 0 1 1 0
1 1 0 0 1 1 1
0 0 0 0 0 1 1

1 0 0 0 1 1 0 0 0 0 1 0 1 0 0 0 0 0 1 1 0 1 0 0 0
0 1 0 0 1 0 0 0 0 0 0 0 0 0 1 0 0 0 1 1 0 0 0 0 0
0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1 0 0 0
0 0 0 1 1 0 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0
1 1 0 1 1 0 0 0 0 0 0 0 0 0 0 1 0 1 0 0 0 0 1 0 0
1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
0 0 0 0 0 0 1 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 0 1 0 0 0 0 0 1 0 0
0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
0 0 0 1 0 0 0 1 0 1 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0
1 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0 0 0 0 0 1 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0
1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0
0 1 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0
0 0 0 1 1 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0 0 1 0 1 0
0 0 1 0 0 0 0 1 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0
0 0 0 0 1 0 0 0 0 0 1 0 0 0 1 0 1 1 0 1 0 0 0 0 0
1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0
1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 0 0 0 0 1
0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0 1 0 0
1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 1 0 0 0
0 0 0 0 1 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 1 0 1 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0
0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1
```

Problem #10
60 Points

Expletives

Test Input File

```
16 8
tim jim sam man mom him tan com saw match batch satchel attach crash cry
lauren
#im
!a#
???
*atch
!@$%$#%#!@$!%$!#^$#^@#%x
@atch
c!@
lauren
```

Test Output File

```
3
4
10
2
0
2
2
1
```

Problem #11
60 Points

Recursion

Test Input File

```
5 6
A(x) {if(x<100) return 1; else return D(x-1)}
B(x) {if(x=16) return 2; else return C(x+2)}
C(x) {if(x=16) return 2; else return B(x+2)}
D(x) {if(x<150) return 149; else return E(x-0)}
E(x) {if(x<150) return 148; else return A(x-0)}
A(50)
A(102)
B(2)
C(4)
D(150)
D(165)
```

Test Output File (The D E A D output should all be on a single line)

```
A
1
A D
149
B C B C B C B C
2
C B C B C B C
2
D E A D
149
D E A D E A D E A D E A D E A D E A D E A D E A D E A D E A D E A D E A D E A D E A D E A D E A D E A D E A D E A D E A D E A D E A
D E A D E A D E A D
149
```

Problem #112
60 Points

Onion 2

Test Output File

```
....................N...
....................N.N.
....................NN..
..................NNNNNNN
...........NNNNNNNNNNN...
.........NNNN.NNN....NN...
......NNN.NNN.....NNNN...
....NNN.NNN......NNNNN...
...NNN.NN......NNN..NN...
...NN.NN......NNN...NN...
..NN.NN......NNN...NNN...
..NNNN......NNN....NNN...
..NNNN......NN.....NNN...
..NNN......NNN....NNNN...
..NNN.....NNN....NNNNN...
...NN.....NN....NNN.NN...
...NN....NNN..NNNNN.NN...
....NN..NNNNNNNNNN.NN....
....NNN.NNNNNNNN..NNN....
....NNNNNN.......NNN.....
...NNNNNNNN...NNNNN......
...NNNNNNNNNNNNNNN.......
.....N.....NNNNN.........
........................
```