CS 4520-6520 Test #4

Goli Harsha

TOTAL POINTS

84 / 120

QUESTION 1

1 Next Fit 17 / 20

- **0 pts** Correct
- **20 pts** Wrong/Not answered
- ✓ **- 3 pts** **one/more blank is wrong.**

Bin 1: 4,2,10
Bin 2: 8
Bin 3: 15
Bin 4: 14
Bin 5: 19
Bin 6: 6

QUESTION 2

2 First Fit 20 / 20

- ✓ **- 0 pts** **Correct**
- **20 pts** Wrong/Not attempted.
- **3 pts** one/more blank wrong.

QUESTION 3

3 TSP 15 / 20

- **0 pts** Correct
- ✓ **- 5 pts** **one or more sub questions are wrong**
- **0 pts** Wrong/Not attempted

c) The answer is 1, 2, 3, 4, 5, 1 and the length is 24.

QUESTION 4

4 Coloring 20 / 20

- ✓ **- 0 pts** **Correct**
- **20 pts** Wrong/Not attempted

QUESTION 5

5 Minimization 12 / 20

- **0 pts** Correct
- ✓ **- 2 pts** **one or more options are wrong**
- **0 pts** Not attempted/Wrong
- **6** **Point adjustment**

OP T > 5 – possible (T)
OP T < 5 – NOT possible (F)
OP T = 5 – possible (T)

OP T > 15 – NOT possible (F)
OP T < 15 – possible (T)
OP T = 15 – possible (T)

OP T > 45 – NOT possible (F)
OP T < 45 – it's actually MUST always be less than 45, so it's TRUE by default (T)
OP T = 45 -– NOT possible (F)

QUESTION 6

6 EC 0 / 20

- **0 pts** Correct
- ✓ **- 20 pts** **Wrong/Not attempted**

TEST #4 **CSc 4520** Spring 2018 NAME Harsha Goli

Honor Code Statement:

"I will not commit any act of academic dishonesty while completing this assignment. I am fully aware that any of my own personal actions while attempting this assignment that are interpreted as academic dishonesty, will be treated as such. I understand that if I am held accountable for an act of academic dishonesty that I will receive a grade of "0" (zero) for this assignment and the incident will be reported to the Dean of Students Office."

Instructions:

For this test: open 1 cheat sheet**, closed ANY electronic devices (e.g. ebook readers, smartphones, and all others) and any other books, notes, etc.**

No name = grade of zero.

Cheating = grade of zero. Speaking to neighbors = cheating. If I think you're cheating => you're cheating. So, no suspicious moves or provoking, please. You won't have a second chance.

Two or more very similar works = cheating = grade of zero for copying/letting to copy.

Write legibly – if TA cannot read it, he/she won't give you a credit for it. If in doubt, it will be resolved to the TA discretion, usually not to your favor.

Answer each problem as fully as you can. Write explanations to all your answers. No explanations = partial credit, no more than 50%. Note that longer explanation does not mean it's the better one, be concise and to the point.

Feel free to use the scratch paper in the end of this quiz. However, whatever you write there is not counted as your answer. Provide answers for each problem in the space right below it. If you need extra sheet of paper, ask you instructor/TAs.

Be considerate of others. Don't click your pen too often, don't speak/whisper to yourself, don't eat crunchy food, etc. Try not to produce any other scratching and shuffling noise.

Student signature: _____ Date: 4.17.2018

#1. You are given 8 items of sizes 4, 2,10, 8,15, 14, 19, 6

You have an infinite supply of bins of size 20.

Pack the items into bins by using Next Fit algorithm.

Bin 1: 4, 2, 10, 16

Bin 2: 8, 6,

Bin 3: 15,

Bin 4: 14,

Bin 5: 19,

Bin 6: _____

(if bin is not used leave the corresponding line empty

#2. You are given 8 items of sizes 4, 2,10, 8,15, 14, 19, 6

You have an infinite supply of bins of size 20.

Pack the items into bins by using First Fit algorithm.

Bin 1: 4, 2, 10,

Bin 2: 8, 6

Bin 3: 15

Bin 4: 14,

Bin 5: 19,

Bin 6: _____

(if bin is not used leave the corresponding line empty

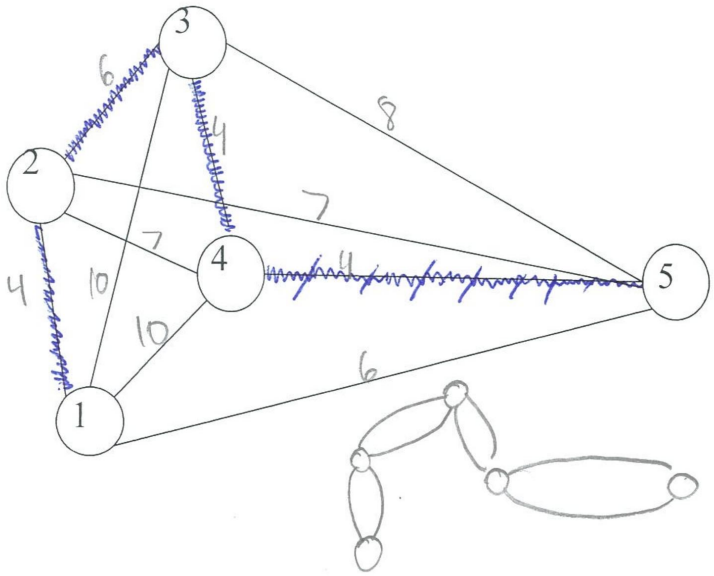
#3. Solve Travelling Salesman Problem for the following graph using **2-MST** algorithm. Costs of edges are given in the list, and triangle inequality should be satisfied (check it!).

a) MST consists of edges: {1,2 2,3 3,4 4,5 }; its length is 18

b) Eulerian cycle: 1 2 3 4 5 4 3 2 1

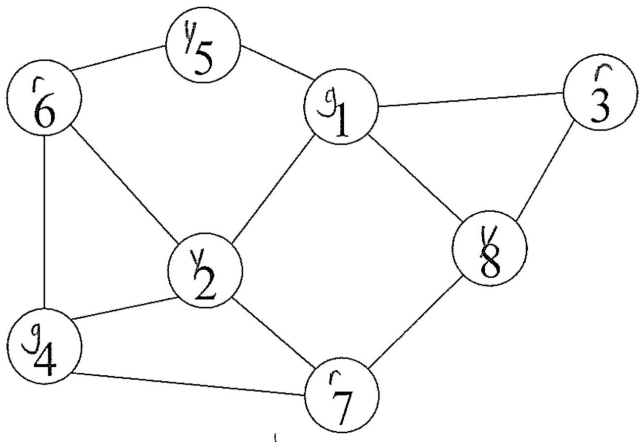
c) Hamiltonian cycle: 1 3 5 4 2 1 ; its length is 33

c(1,2) =4
c(1,3) =10
c(1,4) = 10
c(1,5) =6
c(2,3) =6
c(2,4) =7
c(2,5) = 7
c(3,4) = 4
c(3,5) = 8
c(4,5) =4



#4. Find *proper coloring* of the following graph.

You can use *any* algorithm of your choice for it which can do that.
Describe each iteration of the algorithm.



I'm using greedy algorithm.

Iteration 1. Vertex chosen : 1 Color assigned: g because... green is dope
Iteration 2. Vertex chosen : 5 Color assigned: y 1 is g
Iteration 3. Vertex chosen : 2 Color assigned: y 1 is g
Iteration 4. Vertex chosen : 8 Color assigned: y 1 is g
Iteration 5. Vertex chosen : 3 Color assigned: r 1 is g, 8 is y
Iteration 6. Vertex chosen : 6 Color assigned: r 5 is y, 2 is y
Iteration 7. Vertex chosen : 4 Color assigned: g 6 is r, 2 is y
Iteration 8. Vertex chosen : 7 Color assigned: r 4 is g, 2 is y, 8 is y
...

g
y
r
b
o

#5. Suppose you have a *minimization* problem and an algorithm A which has a performance guarantee 3.
When you run it on some input I, A produced a solution with cost 15.
What can you say about the true (optimal) answer OPT? **Could** it satisfy any of the inequalities? If could be, mark those as **T**(True) or if not – as **F** (False) for respective inequalities and explain your answers.

- OP T > 5 (T) F because:
- OP T < 5 T (F) because:
- OP T = 5 (T) F because: 15/3 = 5
- OP T > 15 T (F) because:
- OP T < 15 (T) F because:
- OP T = 15 T (F) because:
- OP T > 45 (T) F because:
- OP T < 45 T (F) because:
- OP T = 45 (T) F because:

EXTRA credit. Solve Travelling Salesman Problem for the following graph using local search with 2-substitute neighborhoods.

Initial Hamiltonian cycle is 1-3-5-2-4

If you have fewer than 10 iterations, leave excess lines empty. If you have more - then just stop.

Iteration 1. Hamiltonian cycle: _____; its length is ___
Iteration 2. Hamiltonian cycle: _____; its length is ___
Iteration 3. Hamiltonian cycle: _____; its length is ___
Iteration 4. Hamiltonian cycle: _____; its length is ___
Iteration 5. Hamiltonian cycle: _____; its length is ___
Iteration 6. Hamiltonian cycle: _____; its length is ___
Iteration 7. Hamiltonian cycle: _____; its length is ___
Iteration 8. Hamiltonian cycle: _____; its length is ___
Iteration 9. Hamiltonian cycle: _____; its length is ___
Iteration 10. Hamiltonian cycle: _____; its length is ___

c(1,2) =4
c(1,3) =10
c(1,4) = 10
c(1,5) =6
c(2,3) =6
c(2,4) =7
c(2,5) = 7
c(3,4) = 4
c(3,5) = 8
c(4,5) =4