ANSWER KEY

GRADE 11 CST MATH
MIDYEAR EXAM REVIEW
SECTION 2: SHORT ANSWER QUESTIONS

Note:

- You have seen all of these questions before. Your midyear exam will contain 3 short answer questions based on the types of questions in this package.
- Answer key posted on website (thomsonmachigh.weebly.com)
- Please come see me ASAP if you do not understand any of these

LIFE ON MARS

On a meteor of Martian origin, a team of researchers found elements suggesting there could have been life on Mars. We assume that the number of male Martians was not less than the number of female Martians and that the number of female Martians was at least 200. We also believe there were no more than 800 inhabitants on Mars. x = male y = female

a) Give the system of linear inequalities that represents the constraints for this situation.

$x \geq y$

$y \geq 200$

$x + y \leq 800$

MOVING DAY

On moving day, a mix of small 4 kg boxes and large 8 kg boxes have to be moved. A maximum of 60 small boxes and a minimum of 40 large boxes are to be moved, and the team of movers wants to know how many boxes of each type can be moved in a container that holds no more than 600 kg. x = small y = large

a) Give the system of linear inequalities that represents the constraints for this situation.

$x \leq 60$

$y \geq 40$

$4x + 8y \leq 600$

GRADUATION

At a graduation ceremony, some students will receive trophies and certificates. The maximum number of award winners is 120, but at least 80 people have to be honoured. A trophy costs $20 and a certificate, $10. We want to know the number of trophies and certificates we can buy with a $1500 budget. x = trophy y = certificate

a) Give the system of linear inequalities that represents the constraints for this situation.

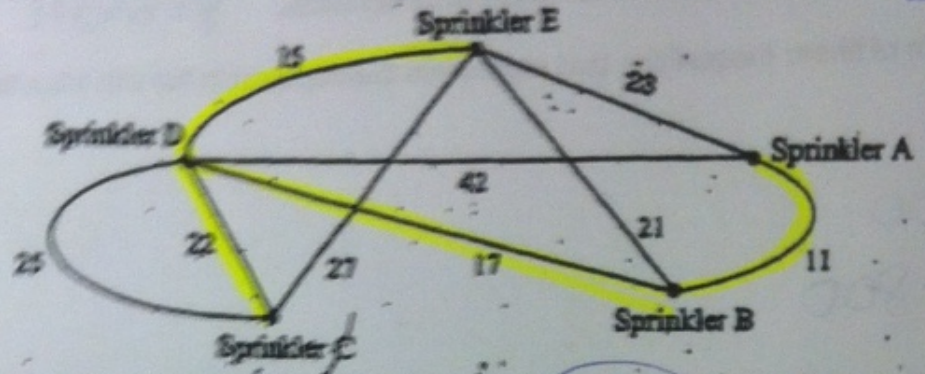
$x + y \leq 120$

$x + y \geq 80$

$20x + 10y \leq 1500$

In this case we are not looking for a path. We just need to connect them all for the lowest price. Usually these types of questions are about piping or electricity.

Steve wants to install a sprinkler system on his property. The vertices of the following graph represent the required sprinklers. Each edge represents a possible water pipe. The number on each edge indicates the length of the pipe in metres.



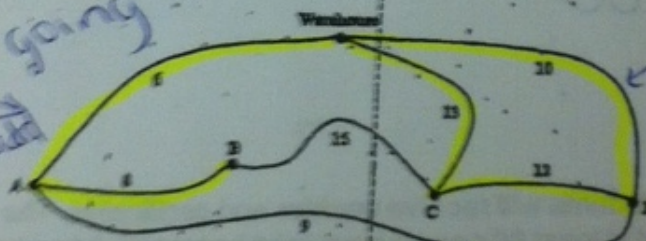
Steve wants to connect all the sprinklers so as to minimize the total combined length of the pipes.

What is the shortest length of piping required to connect all the sprinklers?

22 + 15 + 17 + 11 = 65 m

Peter works as a delivery man for a furniture store. Today, he has to deliver furniture to 4 customers.

In the following graph, vertices A, B, C and D represent the customers. The edges represent the different roads Peter can take. The number on each edge indicates the distance covered (in kilometres) along the corresponding stretch of road.



For this one he is going backwards and forwards

Don't have to add these ones twice because it is cheaper to follow this circ

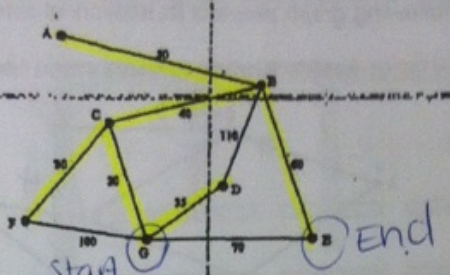
Peter must devise a route that will minimize the total distance he must travel. He can carry furniture for no more than 2 customers at a time. Peter must return to the warehouse after completing his deliveries.

What is the length of the shortest possible route?

6 + 8 + 6 + 8 + 10 + 12 + 13 = 63 km

If you got something different because the numbers were too hard to read that's alright. On your exam the numbers will be clear.

The vertices of the following graph represent the towns on an island. The number on each edge indicates the cost, in dollars, of travelling between two towns.



Tony plans to visit the seven towns on the island. His trip will begin in town G and end in town E.

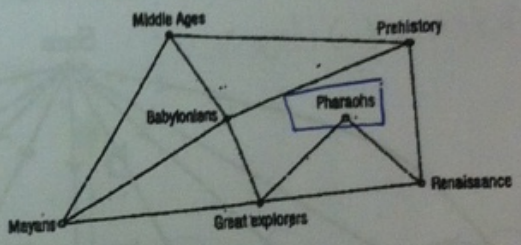
Which route should Tony take in order to minimize his travel costs?

GD DG GC CF FC CB ~~BA~~ AB BE
35 + 35 + 30 + 30 + 30 + 40 + 50 + 50 + 60 = 360

We do not need to use all the edges, just all the points and come back to the start.

The adjacent graph illustrates the possible points of access between a museum's various exhibition rooms. Given that the visit starts in the Pharaohs room, suggest a way to visit each of the rooms once while returning to the original room.

A museum's exhibition rooms

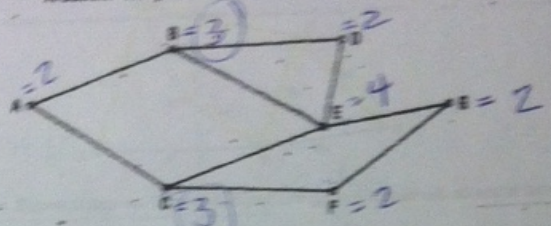


or (1) Ph → Gr.Exp → Bab → May → Mid → Pre → Ren → Ph.
or (2) Ph → Gr Exp → May → Bab → Mid → Pre → Ren → Ph.
or (3) Ph → Gr Exp → May → Mid → Bab → Pre → Ren → Ph.

... or any of these in the opposite direction.

To send a signal from one user to another, a cellular telephone company uses many antennas. The following graph presents its network of antennas.

A cellular telephone company's antenna network



looking for Euler path

2 odd degrees

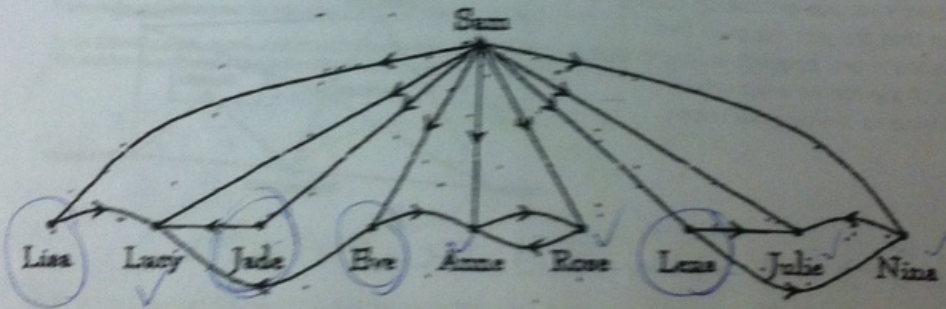
A technician tests network reliability by emitting a signal that starts from Antenna C and must travel the entire network without using the same transmission line twice. Identify this transmission path.

CFGECABEDB

Note: There are other possibilities but they will all start at C and end at B. And you need to cover all lines.

Sam is the coach of a volleyball team. He has to cancel tonight's practice. The 9 players must be notified by telephone.

In the following graph, Sam and the players are each represented by a vertex. The edges represent the calls that could be made. For example, the edge directed from Lisa to Lucy indicates that Lisa knows Lucy's telephone number and can call her.



Sam would like to make the fewest number of calls possible.

What is the minimum number of calls Sam must make? 4 calls.

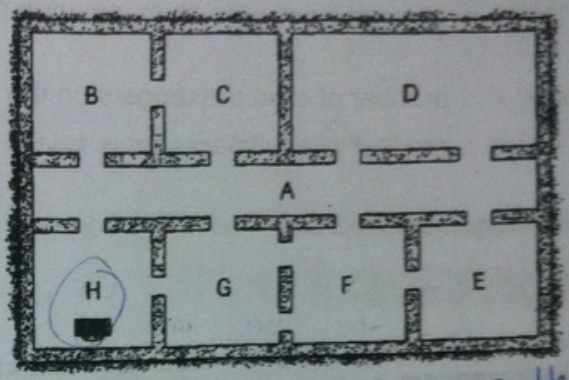
$ 205

(17)

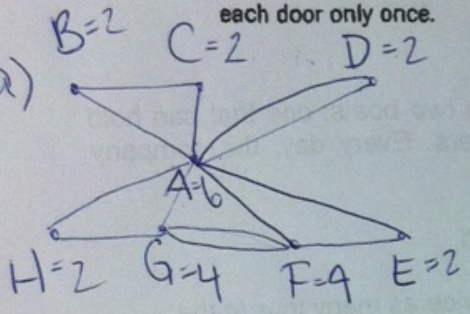
night watchman at a factory must go through all the doors during his rounds. His office is
room H.

a) Construct a graph in which the vertices are the different rooms. Draw an edge if a door connects one room to another.

b) Explain how the watchman can make his rounds going through each door only once.



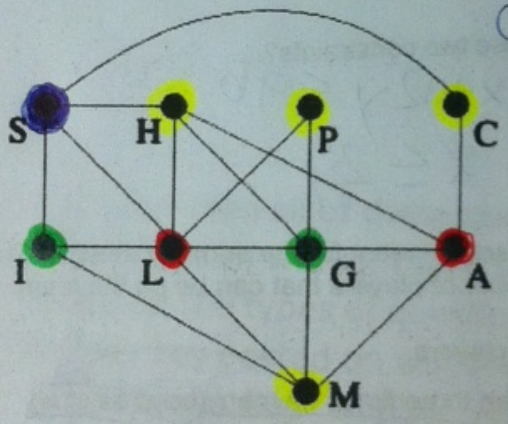
a)



b) All even degrees means there is a Euler circuit.
ex: HABCADAEFAGFGH.

What is the chromatic number of the following graph?

Chromatic number=4



Note: Could have figured it out differently but you would still arrive at 4 colours if no 2 points connected by a line are the same colour.

#1) An airline is having a seat sale for a flight. In order for this flight to be profitable, the following two constraints regarding the number of passengers must be taken into account:

- There must be a minimum of 50 passengers.
- There must be at least twice as many adult passengers as child passengers.

where x : number of child passengers on the flight
y : number of adult passengers on the flight

$x+y \geq 50$
$y \geq 2x$

What inequalities represent these two constraints?

2) A company takes people to Red Rock Island using two boats: one that can hold 8 passengers and one that can hold 12 passengers. Every day, the company faces the following two constraints:

- At most, 96 passengers can be taken to the island.
- The 8-passenger boat can make a maximum of twice as many trips to the island as the 12-passenger boat.

x : number of trips made to the island by the 8-passenger boat every day
y : number of trips made to the island by the 12-passenger boat every day

What inequalities represent these two constraints?

$8x+12y \leq 96$
$x \leq 2y$

3) John wants to form a mixed soccer team for the summer season. The following two constraints limit the number of players that can be on the team.

- There must be at least 14 players.
- There must be no more than three times as many boys as girls.

x : number of girls on the team
y : number of boys on the team

$x+y \geq 14$
$y \leq 3x$

What inequalities represent these two constraints?