Mandatory 3

- Frist 3 mai 23:59
- Poeng 10
- Spørsmål 8
- Tidsgrense 240 minutt

Instruksjonar

This is the mandatory assignment #3. It will work just like the first one so you can only do it once and you have four hours for it from when you start.

You need at least 3.5 points to pass this mandatory assignment.

Good luck!

Forsøkhistorikk

	Forsøk	Tidspunkt	Resultat
SISTE	Forsøk 1	153 minutt	10 av 10

Resultat for denne quizen: 10 av 10
Innlevert 3 mai 10:15
Dette forsøket tok 153 minutt.

Spørsmål 1
1 / 1 poeng

How many functions are there from the set $\{1, \ldots, 10\}$ to the set $\{0, 1\}$

a) such that the functions assigns 0 to 1 and 10: 256

b) such that the functions assigns 0 to exactly 2 inputs 45

c) such that the functions are surjective 1022

Svar 1:
Rett! 256

Rett!

256

Svar 2:

Rett! 45

Rett!

45

Svar 3:

Rett! 1022

Rett!

1022

Spørsmål 2

1 / 1 poeng

In a bowl of 12 blue and 13 red balls how many balls must you take to make sure

a) you will have at least two balls of the same color 3

b) you will have at least 2 blue balls 15

c) you will have at least 2 blue balls and 3 red balls 15

Svar 1:

Rett! 3

Rett!

3

Svar 2:

Rett! 15

Rett!

15

Svar 3:

Rett! 15

Rett!

15

Spørsmål 3

1 / 1 poeng

a) What is the coefficient of x^5 in $(1+x)^{11}$: 462

b) What are the coefficient of $x^{10}y^3$ in $(2x-3y)^{13}$ -7907328

Svar 1:
Rett! 462
Rett!
462
Svar 2:
Rett! -7907328
Rett!
-7907328

Spørsmål 4
1 / 1 poeng

What is the probabability that a randomly generated bit string of length 6 does not contain a zero if bits are independent and

a) a 0 bit and a 1 bit are equaly likley 1/64

b) the probabability that the i-th bit is 1 is $\frac{1}{2^i}$ for i=1,...,6 1/2097152

Svar 1:
Rett!
1/64
1/128

127/128
63/64
Svar 2:
32767/32768
2097151/2097152

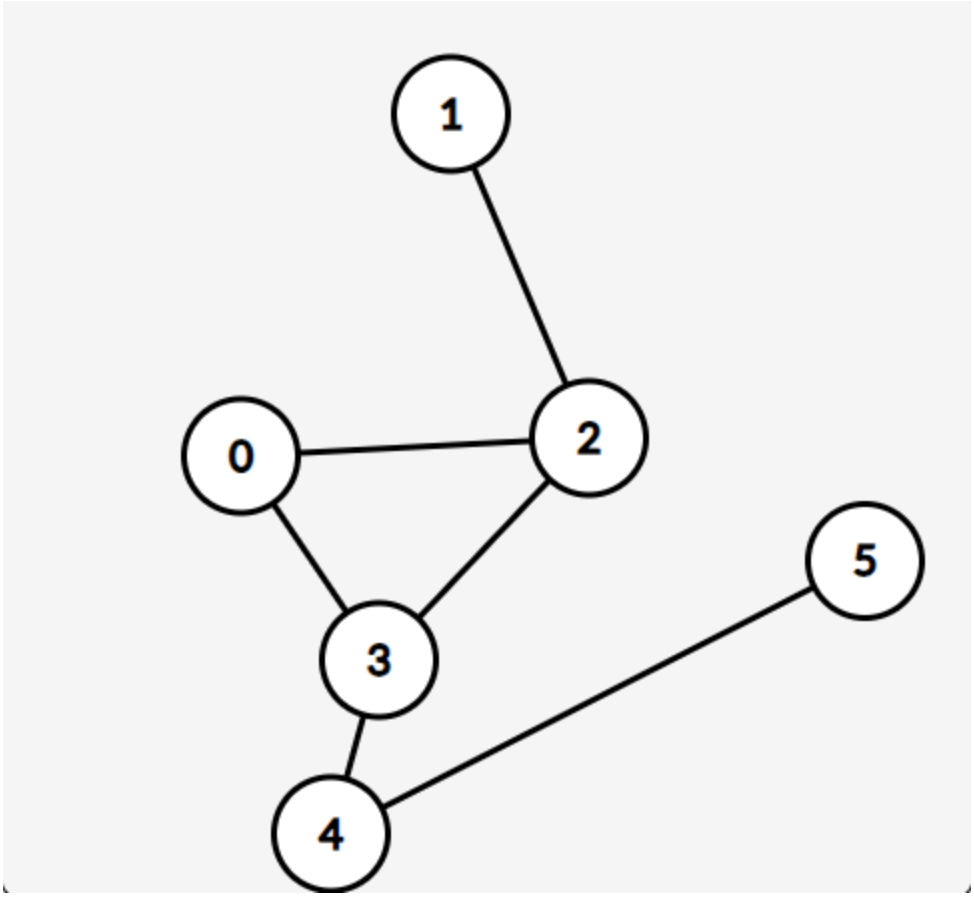
1/32768

Rett!

1/2097152

Spørsmål 5

1 / 1 poeng



Answer the following questions about the graph G above:

a) How many edges are in the graph G [Vel]

b) Is the graph G bipartite [Vel]

c) How many 1-s are in the adjacency matrix of G [Vel]

d) How many edges are there in the induced subgraph of G containing the vertecies 0,2,3,4

[Vel]

e) How many nodes are there in the largest bipartite subgraph of G 6

Svar 1:

5

4

7

Rett!

6

Svar 2:

Rett!

False

True

Svar 3:

10

Rett!

12

13

6

Svar 4:

5

6

Rett!

4

3

Svar 5:

5

4

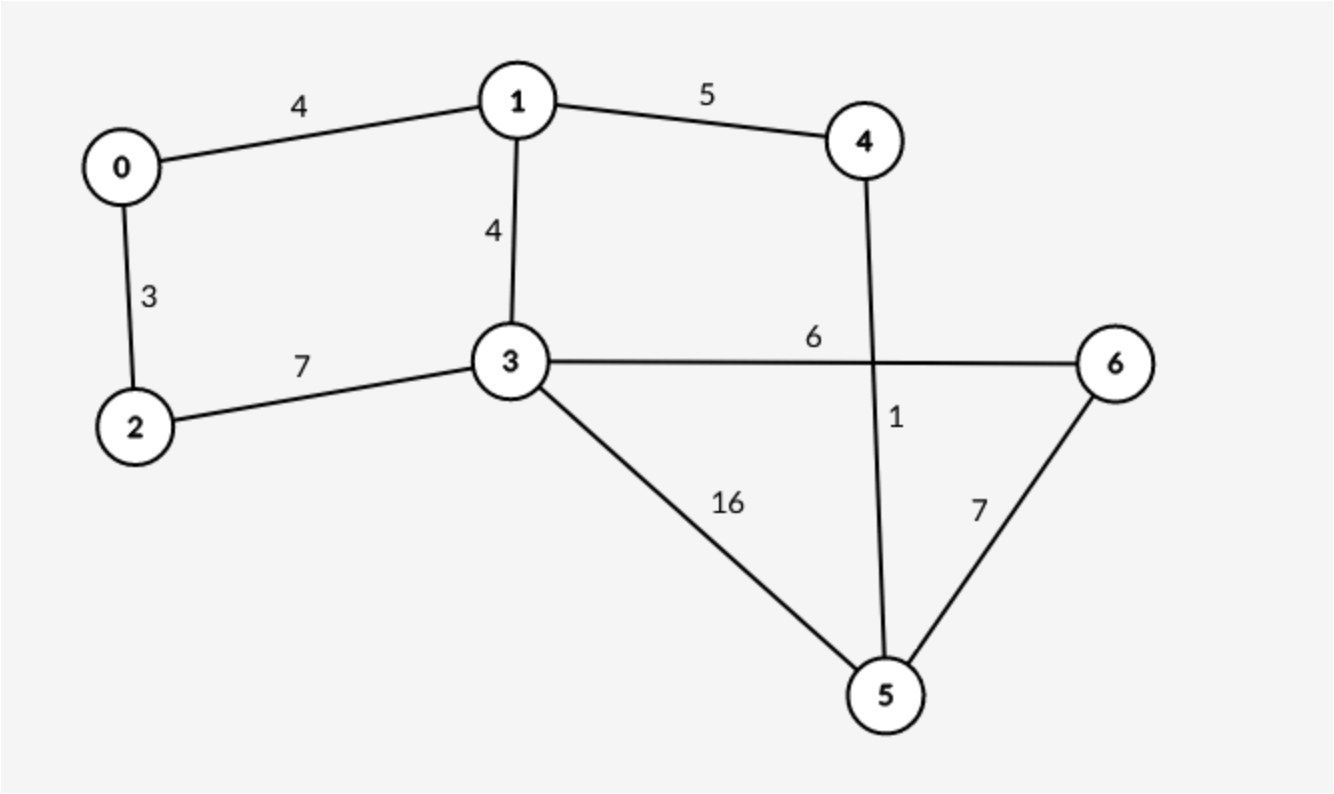
Rett!

6

7

Spørsmål 6

2 / 2 poeng



We run dijkstra from node 0 in the graph above. We say that a node v is visited whenever dijkstra has calculated the optimal distance from 0 to v (Whenever the node is popped from the priority queue). In what order does dijkstra visit the nodes above?

Rett!
1. node visited

0

Rett!
2. node visited

2

Rett!
3. node visited

1

Rett!
4. node visited

3

Rett!
5. node visited

4

Rett!
6. node visited

5

Rett!
7. node visited

6

Spørsmål 7
2 / 2 poeng

Assume G is the graph with the Adjacency matrix $A = \begin{pmatrix} 0 & 1 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 \end{pmatrix}$ where the vertecies are ordered as a,b,c,d,e.

you are also given that $A * A = A^2 = \begin{pmatrix} 3 & 1 & 2 & 1 & 1 \\ 1 & 2 & 1 & 1 & 2 \\ 2 & 1 & 4 & 0 & 1 \\ 1 & 1 & 0 & 1 & 1 \\ 1 & 2 & 1 & 1 & 2 \end{pmatrix}$, $A^3 = \begin{pmatrix} 4 & 5 & 6 & 2 & 5 \\ 5 & 2 & 6 & 1 & 2 \\ 6 & 6 & 4 & 4 & 6 \\ 2 & 1 & 4 & 0 & 1 \\ 5 & 2 & 6 & 1 & 2 \end{pmatrix}$,

$A^4 = \begin{pmatrix} 16 & 10 & 16 & 6 & 10 \\ 10 & 11 & 10 & 6 & 11 \\ 16 & 10 & 22 & 4 & 10 \\ 6 & 6 & 4 & 4 & 6 \\ 10 & 11 & 10 & 6 & 11 \end{pmatrix}$

Here a path can have repeated vertices and edges just like the book defines it in chapter 10.4 (this is usually called a walk)

a) How many paths of length 2 are there in total 34

b) how many paths of length 3 are there which starts starts at b and ends at c 6

c) Consider strings of length 5, where each letter is either a,b,c,d,e, but we only allow two consecutive letters if there is an edge between these letter in the graph represented by the adjacency list A. So for example aebca is not a valid string since eb are two consecutive letters, but there is no edge between e and b, while cdcae is a valid string since there is an edge cd,dc,ca and ae in the graph. How many such strings exist 242

Svar 1:
Rett! 34
Rett!
34

Svar 2:
Rett! 6
Rett!
6

Svar 3:
Rett! 242
Rett!
242

Spørsmål 8
1 / 1 poeng

In the combat sport ground karate there are 5 possible belts denoting skill level. In increasing skill levels these belts are white, blue, purple, brown and black. Assume that the number of people in a class with each belt drops by half for each belt level. So there are half as many blue belt as white belt, half as many purple belts as blue belts and so on.

a) What is the probability that a random person in the class has a black belt 1/32

b) What is the probability that in a class of 100 people that there is **no** person with a black belt0.04

c) In a class of 100 people what is the probability of there being exactly 2 people with a blackbelt. 0.22

Svar 1:

1/8

1/10

Rett!

1/32

1/24

Svar 2:

0.11

Rett!

0.04

0.06

0.02

Svar 3:

0.15

0.05

0.01

Rett!

0.22

Quizresultat: 10 av 10