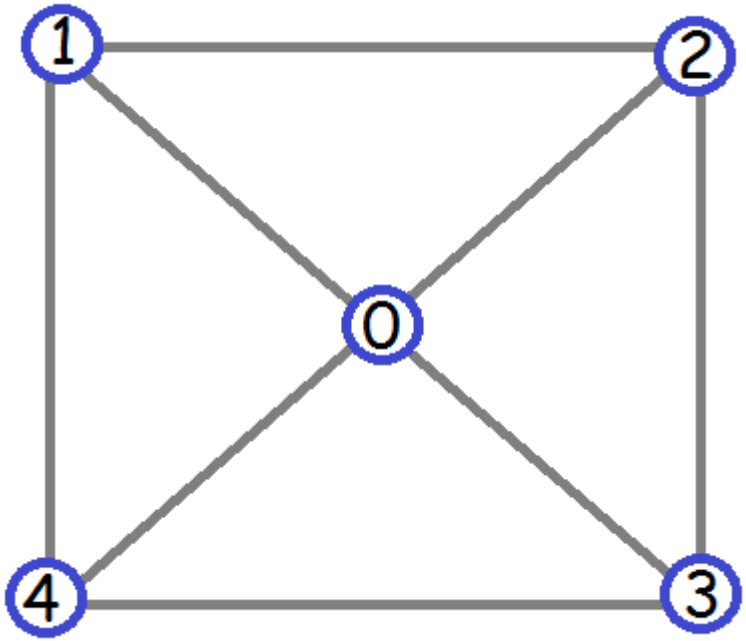
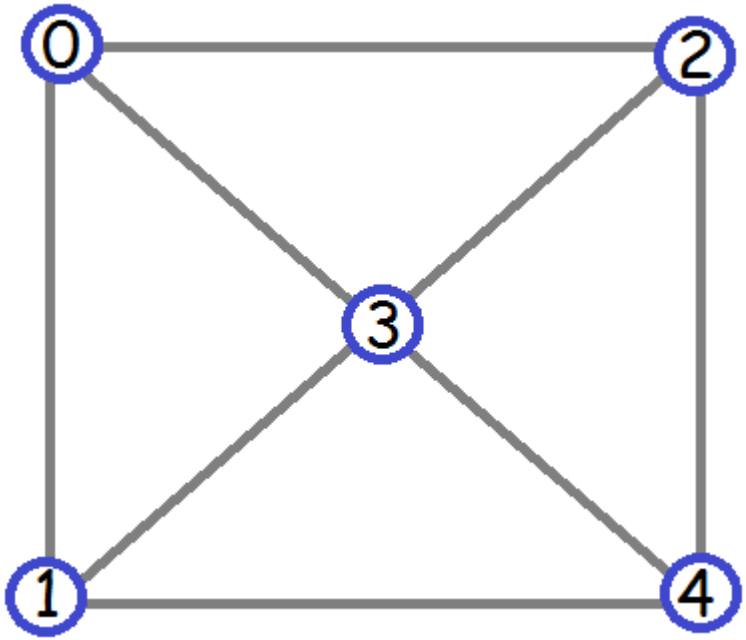
1. What is the canonical form for this embedding?
2. What are the automorphisms of the canonical form?



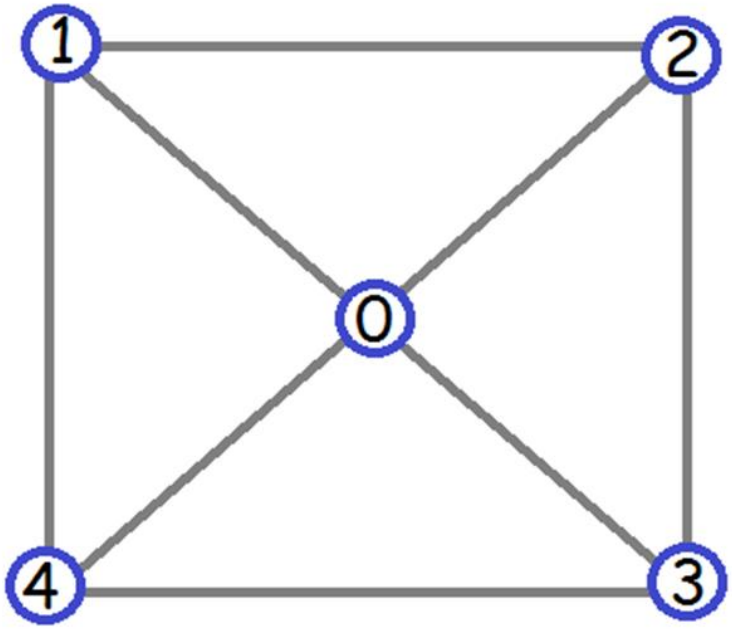
Canonical form:



Automorphisms:

0 1 2 3 4
0 2 1 3 4
1 0 4 3 2
1 4 0 3 2
2 0 4 3 1
2 4 0 3 1
4 1 2 3 0
4 2 1 3 0

Only 8 students had correct output for this embedding:



At most 7 programs were correct since 1 of the 8 failed on this one:

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

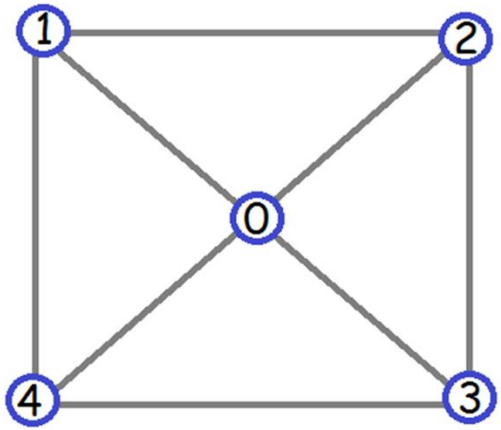
If your program was correct: you have bonus marks. You do not have to resubmit.

If your program was not correct: there is a place on connex you can resubmit under the assignments.

Assignment #4: Resubmission
Deadline for resubmissions:
Wed. Nov 26, 11:55 pm

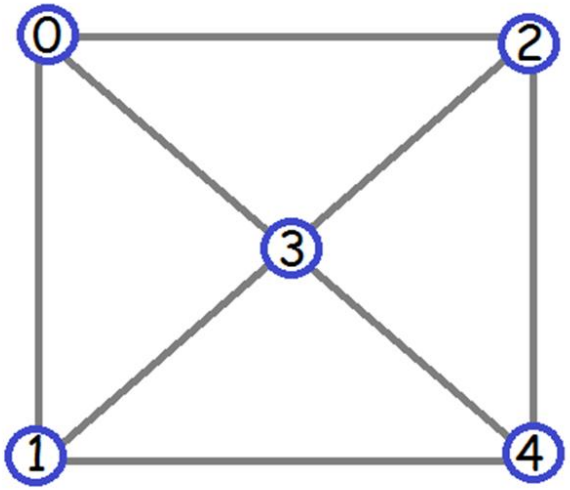
The input file:

```
5
4 1 2 3 4
3 0 4 2
3 0 1 3
3 0 2 4
3 0 3 1
```




```
5
3 1 2 3
3 0 3 4
3 0 4 3
4 0 2 4 1
3 1 3 2
8
0 1 2 3 4
0 2 1 3 4
1 0 4 3 2
1 4 0 3 2
2 0 4 3 1
2 4 0 3 1
4 1 2 3 0
4 2 1 3 0
```

Expected Output



How are the assignments graded?

1. On connex, click on “Grade” for assignment #4.
2. Click on “Download All”
3. Download everything in a file call by default bulkdownload.zip
4. unzip bulkdownload.zip
5. It makes a subdirectory for each student with submissions in Submission attachment(s)/

The original file names are ugly (have spaces in them which is not very unix friendly):

Aftias, Robert(raftias)/
Anderson, Adam(adamandy)/
Ben-Zvi, Tom(tbenzvi)/
Clarkson, Kyliah(karajade)/
Conley, Patrick(pconley)/
Dufour, Isabelle(idufour)/

I rename the directories:

I type ls -l > old_names, then have a program that makes a command file with commands like this (one per student):

```
mv Aftias,\ Robert\(raftias\)/Submission\ attachment\(s\)
Aftias,\ Robert\(raftias\)/submission/

mv Aftias,\ Robert\(raftias\)/ Aftias
```

I have to be careful here with students who have the same last names.

The directory names are now:

Aftias/
Ben-Zvi/
Clarkson/
Conley/
Dufour/
…

The next step is to compile your programs:
The file 1build_com has (csh):

```
foreach sub (*/submission)
    echo Building for $sub:h
    pushd $sub >& /dev/null
    ../../doBuild.sh
    popd >& /dev/null
end
```

The file doBuild.sh has:

```
#!/bin/bash

ls *.c >/dev/null 2>&1
cfiles=$?
ls *.java >/dev/null 2>&1
jfiles=$?
ls *.cpp >/dev/null 2>&1
pfiles=$?
```

This sets the variables to 0 if files of that type exist.

```
if [ "$cfiles" == "0" ]; then
 gcc -std=c99 *.c  >q0_buildlog.txt 2>&1
elif [ "$jfiles" == "0" ]; then
 javac *.java >q0_buildlog.txt  2>&1
elif [ "$pfiles" == "0" ]; then
 g++ *.cpp >q0_buildlog.txt  2>&1
else
 echo No source files were found! >
                  q0_buildlog.txt
fi
cat q0_buildlog.txt
```

The file q0_buildlog.txt has both standard output and standard error messages from the compilation.

The file 2run_com has:

```
setenv LIBC_FATAL_STDERR_ 1

foreach sub (*/submission)
  echo Running tests for $sub:h
  pushd $sub >& /dev/null
  ../../doRunTests.sh >& o0_test
  cat o0_test
  popd >& /dev/null
end
```

The o0_test has errors from trying to run the code.

The file doRunTest.sh has

```
#!/bin/bash


ls *.c >/dev/null 2>&1
cfiles=$?
ls *.java >/dev/null 2>&1
jfiles=$?
ls *.cpp >/dev/null 2>&1
pfiles=$?
```

```
if [ "$cfiles" == "0" ]; then
   cmd="./a.out"
elif [ "$jfiles" == "0" ]; then
   cmd="java Simplex"
elif [ "$pfiles" == "0" ]; then
   cmd="./a.out"
else
   cmd="echo No program found!"
fi

time $cmd < ../../i1 > o1  2>&1
cat o1 > out_check
../../check o1 ../../o1 >> out_check
```

The check program reads in the student answer and my answer and compares them to see if they are the same or not.

So to do all the tests, I type:

```
source 1build_com
source 2run_com
```

Then to look at your answers:

```
more */*/out_check
```

or

```
vi */*/out_check
```

to edit them with vi

I left off
#include <stdlib.h>
from my program to trigger an error:

```
Building for Aftias
Building for Ben-Zvi
…
Building for Myrvold
sphere_can.c: In function main:
sphere_can.c:74:4: warning: implicit
declaration of function exit
…
Building for Paquette
```

```
Running the tests:
Running tests for Aftias
Running tests for Ben-Zvi
…
Running tests for Myrvold
../../doRunTests.sh: line 23:
18587 Segmentation fault
(core dumped)
$cmd < ../../i0 > o0 2>&1
Running tests for Paquette
…
```

```
the CanonicalForm is as follow:
5
3 1 2 3
4 0 3 4 2
3 0 1 4
3 0 4 1
3 1 3 2
the number of the automorphisms are 8
the automorphisms are as follow:
0 1 2 3 4
0 1 3 2 4
2 1 0 4 3
2 1 4 0 3
3 1 0 4 2
3 1 4 0 2
4 1 2 3 0
4 1 3 2 0
```

Error- failed to read in student graph 1

```
5
3    1    2    3
3    0    3    4
3    0    4    3
4    0    2    4    1
3    1    3    2

Number of
Automorphisms: 0
```

Graph 1:
Error- failed
to read in
number of
automorphisms.

```
 5
  3 1 2 3
  3 0 3 4
  3 0 4 3
  4 0 2 4 1
  3 1 3 2
(0 3)(1 0)(2 1)(3 4)(4 2)
(0 3)(1 0)(2)(3 4)(4 1)
(0 3)(1 2)(2 0)(3 1)(4)
(0 3)(1)(2 0)(3 2)(4)
(0 3)(1 4)(2)(3 0)(4 1)
(0 3)(1 4)(2 1)(3 0)(4 2)
(0 3)(1)(2 4)(3 2)(4 0)
(0 3)(1 2)(2 4)(3 1)(4 0)
Automorphisms: 8
```

```
Automorphisms: 8
Graph   1: Error- failed
to read in number of
automorphisms.
```

5
3 1 2 3
3 0 3 4
3 0 4 3
4 0 2 4 1
3 1 3 2
8
(0 1 2 3 4)
(0 1 4 3 2)
(0 2 1 4 3)
(0 2 3 4 1)
(0 3 2 1 4)
(0 3 4 1 2)
(0 4 1 2 3)
(0 4 3 2 1)

Error in trying to read in student group

```
5
 3   1   2   3
 3   0   3   4
 3   0   4   3
 4   0   2   4   1
 3   1   3   2

8 Automorphism(s):
 1   2   4   0   3
 1   4   2   0   3
 2   1   3   0   4
 2   3   1   0   4
 3   2   4   0   1
 3   4   2   0   1
 4   1   3   0   2
 4   3   1   0   2
```

Error in trying to read in student group.

```
5
 3    1  2  3
 3    0  3  4
 3    0  4  3
 4    0  2  4  1
 3    1  3  2

 0  1  2  3  4
 2  0  4  3  1
 1  4  0  3  2
 4  2  1  3  0
 0  2  1  3  4
 1  0  4  3  2
 2  4  0  3  1
 4  1  2  3  0
8
```

Error in automorphism group order:
Wendy 8
Student 0
Comparing 0 permutations
Error- Wendy has more permutations.

```
5     3   1   2   3   3   0   3   4
      3   0   4   3   4   0   2   4   1
      3   1   3   2

7
  3   0   1   4   2
  3   1   0   2   4
  3   1   4   2   0
  3   2   0   1   4
  3   2   4   1   0
  3   4   1   0   2
  3   4   2   0   1
```

Error in automorphism group order:
Wendy 8
Student 7
Comparing 7 permutations
Error in permutation 0:
Wendy : 0 1 2 3 4
Student: 3 0 1 4 2

```
 5
3   1   2   3
3   0   3   4
3   0   4   3
4   0   2   4   1
3   1   3   2
8
1   0   2   3   4
1   0   4   3   2
1   2   0   4   3
1   2   3   4   0
1   3   2   0   4
1   3   4   0   2
1   4   0   2   3
1   4   3   2   0
```

```
Comparing 8 permutations.
Error in permutation   0:
Wendy  :  0  1  2  3  4
Student:  1  0  2  3  4
```