PIC 10A 1A

TA: Bumsu Kim

Today…

- Homework Tips
- Exercises
  - Math Functions
  - Product of Digits
- String Manipulations
- Quick Quizzes

Homework Tips

- If you’re not using VS for your HW (e.g. CLion, Xcode, etc.) then make sure that your code run on VS 2022 (in PICLAB)
    - You should create a project to run your code in VS
    - Review how to create a project in VS

- File names are extremely important when you’re submitting a HW
    - It is because that the reader will use an automated system to run your code
    - If the file names don’t match, it will fail to run and you will lose points for it

- The output accuracy (including formatting) is also very important

```
cout << "Hello, World!" << endl; // if the output is supposed to be this,
cout << "Hello World!" << endl; // this is wrong
cout << "Hello, world!" << endl; // this is also wrong
```

Exercise – Math functions

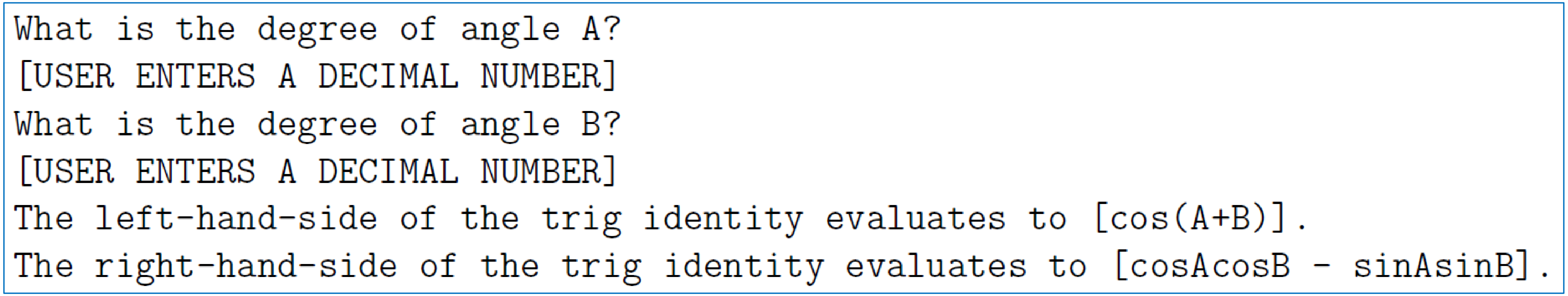
Download the template on Github

- (Trigonometric Addition Formula)
- Write a program that verifies the trigonometric identity:

$$\cos(A + B) = \cos A \cos B - \sin A \sin B$$

- Input two angles A and B in degrees from user and convert the angles to radians
- Then output $\cos(A + B)$ and $\cos A \cos B - \sin A \sin B$
- Input and output should be exactly:

Hint: define π as a `constant double` for your conversion

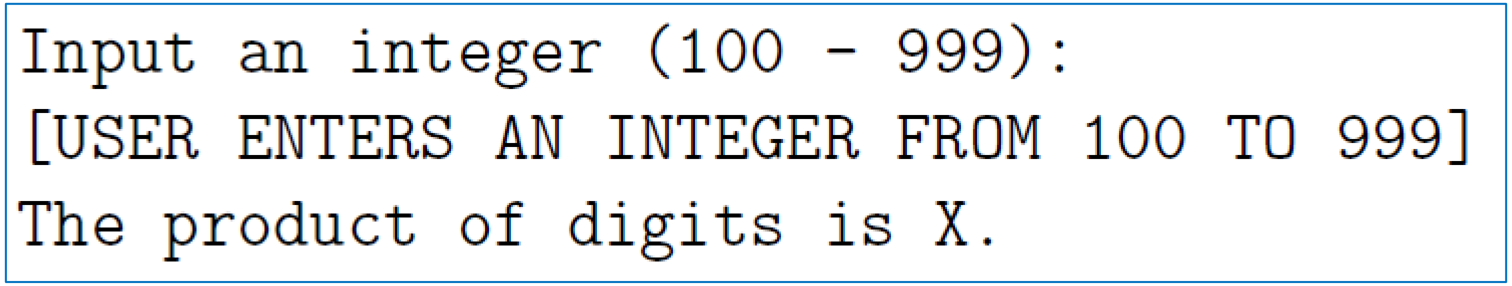


```
What is the degree of angle A?
[USER ENTERS A DECIMAL NUMBER]
What is the degree of angle B?
[USER ENTERS A DECIMAL NUMBER]
The left-hand-side of the trig identity evaluates to [cos(A+B)].
The right-hand-side of the trig identity evaluates to [cosAcosB - sinAsinB].
```

Exercise – Product of Digits

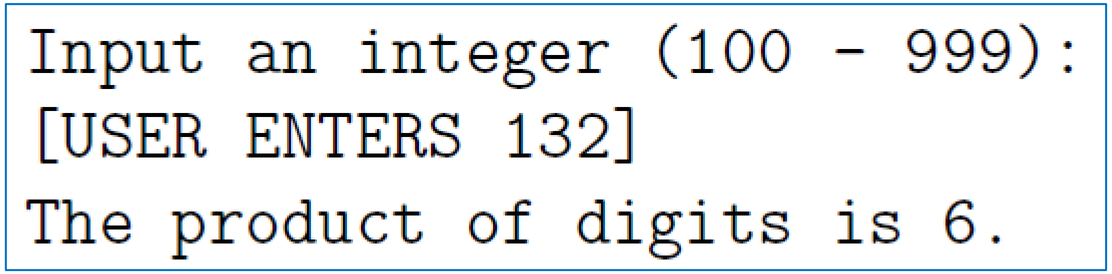
Download the template on Github

- Write a program to input a positive integer from user and calculate the product of digits
- Your code should work for all integers ranging from 100 to 999
- Input and output should be exactly:



```
Input an integer (100 - 999):
[USER ENTERS AN INTEGER FROM 100 TO 999]
The product of digits is X.
```

- An example:

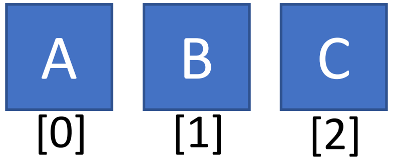


```
Input an integer (100 - 999):
[USER ENTERS 132]
The product of digits is 6.
```

String Manipulations

- Recall the type `char`, used to store a single character
- Strings can be thought as a `char` array (i.e., a sequence of `char` variables), with some *features*

```
string str1 = "ABC";
```



Sequence of char objects
Each `char` can be accessed by the **[ ] operator** (subscript operator)
e.g. `str1[1]`

```
str1.length();
```

This expression returns the length of the string

```
str1.substr(0, 2);
```

This expression returns the substring starting from 0th position with length 2

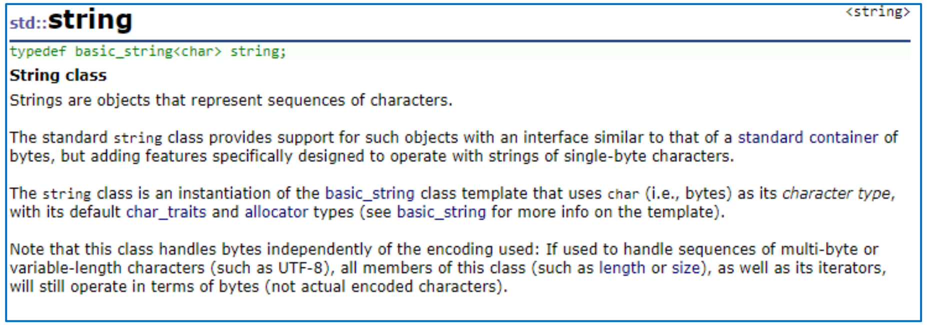
```
str1 + "DEF";
```

This expression returns the string formed by concatenating `str1` and `"DEF"`, so the resulting string contains `"ABCDEF"`

String Manipulations

- There are a lot of useful features defined for string
- You can find them in the lecture notes

- Good Reference: http://cplusplus.com/
  - Teaching *how* to fish is in fact more efficient
  - Right now it can be hard for you to read the documentation
  - But you will be much more comfortable at reading it by the end of this course
  - e.g. Documentation for `string`:



std::**string** <string>

```
typedef basic_string<char> string;
```

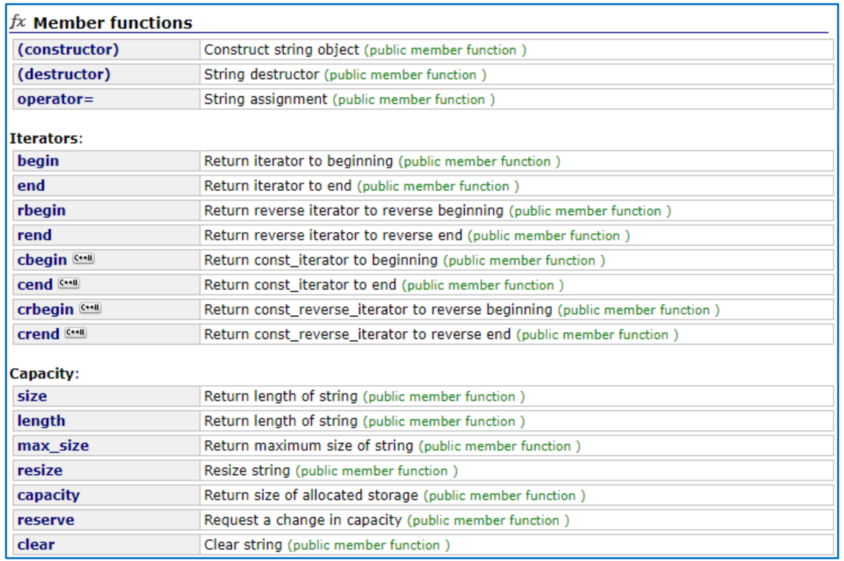
String class

Strings are objects that represent sequences of characters.

The standard `string` class provides support for such objects with an interface similar to that of a standard container of bytes, but adding features specifically designed to operate with strings of single-byte characters.

The `string` class is an instantiation of the basic_string class template that uses `char` (i.e., bytes) as its *character type*, with its default char_traits and allocator types (see basic_string for more info on the template).

Note that this class handles bytes independently of the encoding used: If used to handle sequences of multi-byte or variable-length characters (such as UTF-8), all members of this class (such as length or size), as well as its iterators, will still operate in terms of bytes (not actual encoded characters).



fx **Member functions**

(constructor)	Construct string object (public member function)
(destructor)	String destructor (public member function)
operator=	String assignment (public member function)

Iterators:

begin	Return iterator to beginning (public member function)
end	Return iterator to end (public member function)
rbegin	Return reverse iterator to reverse beginning (public member function)
rend	Return reverse iterator to reverse end (public member function)
cbegin C++11	Return const_iterator to beginning (public member function)
cend C++11	Return const_iterator to end (public member function)
crbegin C++11	Return const_reverse_iterator to reverse beginning (public member function)
crend C++11	Return const_reverse_iterator to reverse end (public member function)

Capacity:

size	Return length of string (public member function)
length	Return length of string (public member function)
max_size	Return maximum size of string (public member function)
resize	Resize string (public member function)
capacity	Return size of allocated storage (public member function)
reserve	Request a change in capacity (public member function)
clear	Clear string (public member function)

Quiz #1

- Q) What is the output for the following code?

```
string s1, s2, s3;
s1 = "PIC";
s2 = "10A";
s3 = s1 + s2;
s3 += "\n";
cout << s2.length()
   << " " << s3.length();
```

Output is ...

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Quiz #1

- Q) What is the output for the following code?

```
string s1, s2, s3;
s1 = "PIC";
s2 = "10A";
s3 = s1 + s2;
s3 += "\n";
cout << s2.length() << " " << s3.length();
```

- A) 3 7

```
string s1, s2, s3;
s1 = "PIC";   // length == 3
s2 = "10A";
s3 = s1 + s2; // s3 == "PIC10A"   (length == 6)
s3 += "\n";   // s3 == "PIC10A\n" (length == 7)
cout << s2.length() << " " << s3.length();
```

Quiz #2

- Q) Suppose a,b,c are int type variables that have been initialized appropriately. Reorder the following lines to swap the values of a and b. The value that c stores doesn't matter.

```
(1) a = b;
(2) b = c;
(3) c = a;
```

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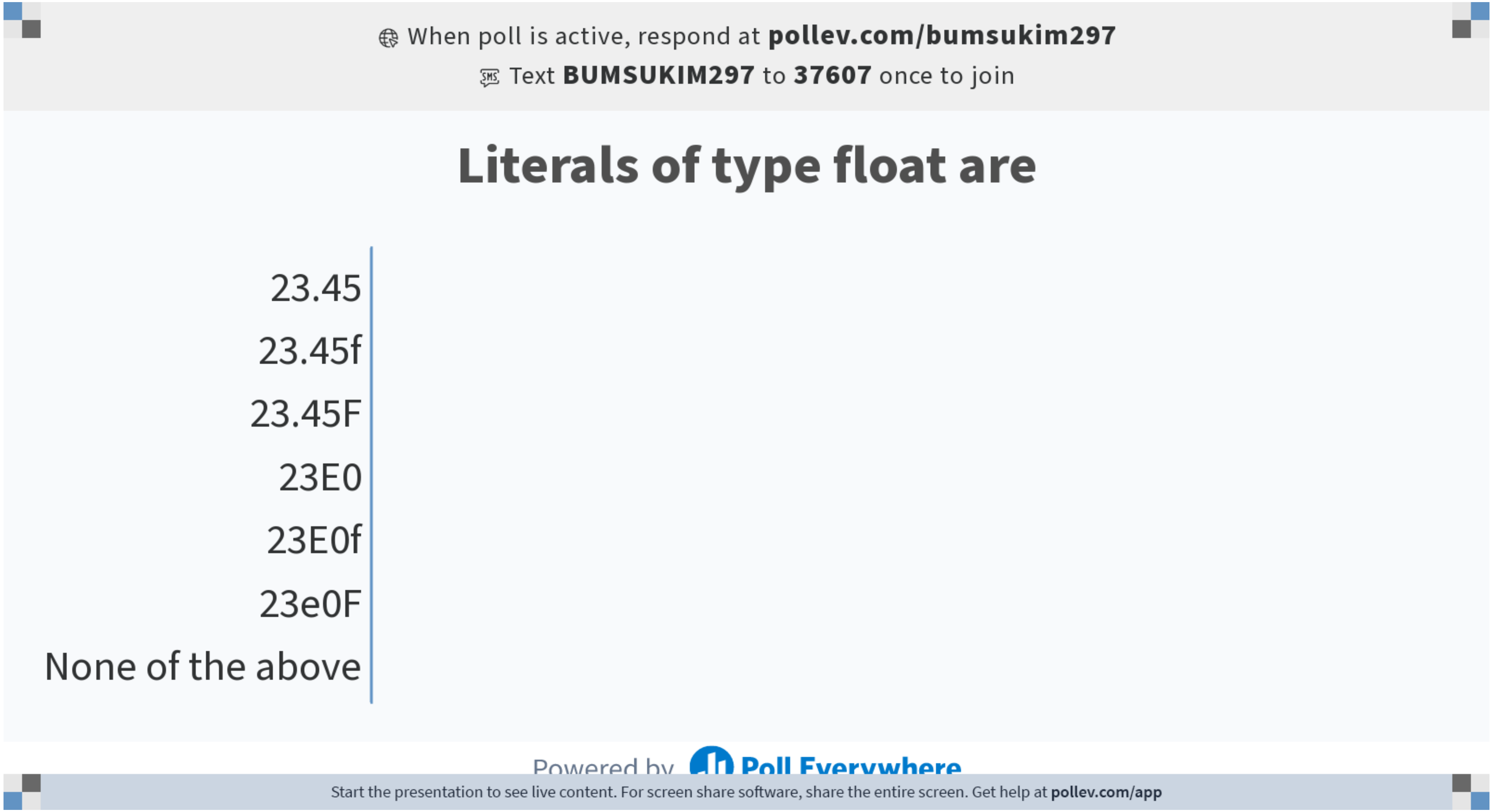
Quiz #2

- Q) Suppose a,b,c are int type variables that have been initialized appropriately. Reorder the following lines to swap the values of a and b. The value that c stores doesn't matter.

```
(1) a = b;
(2) b = c;
(3) c = a;
```

- A) (3)-(1)-(2)

Quiz #3



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Literals of type float are

23.45

23.45f

23.45F

23E0

23E0f

23e0F

None of the above

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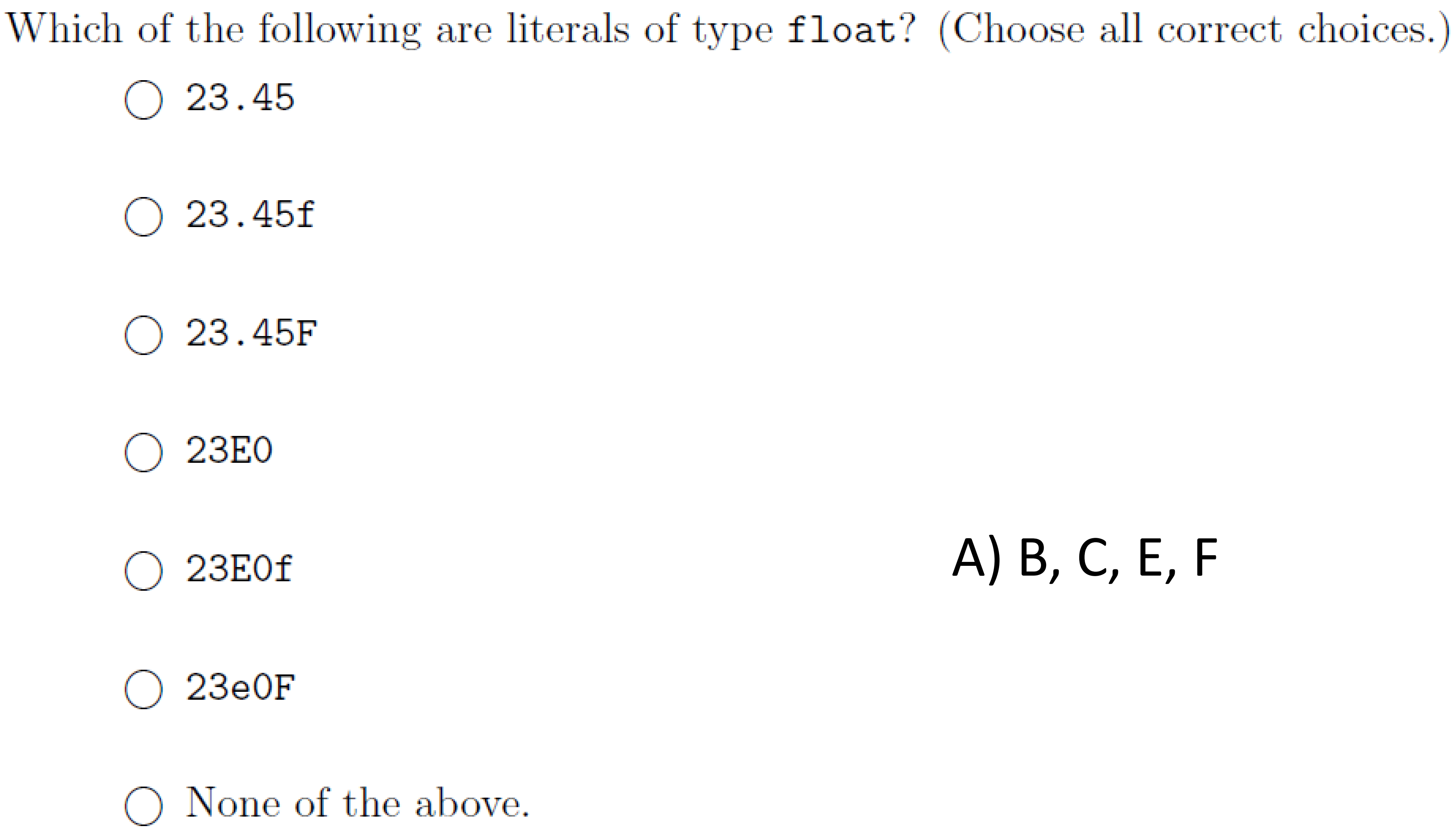
Quiz #3

- Q)



Which of the following are literals of type `float`? (Choose all correct choices.)

○ `23.45`

○ `23.45f`

○ `23.45F`

○ `23E0`

○ `23E0f`

○ `23e0F`

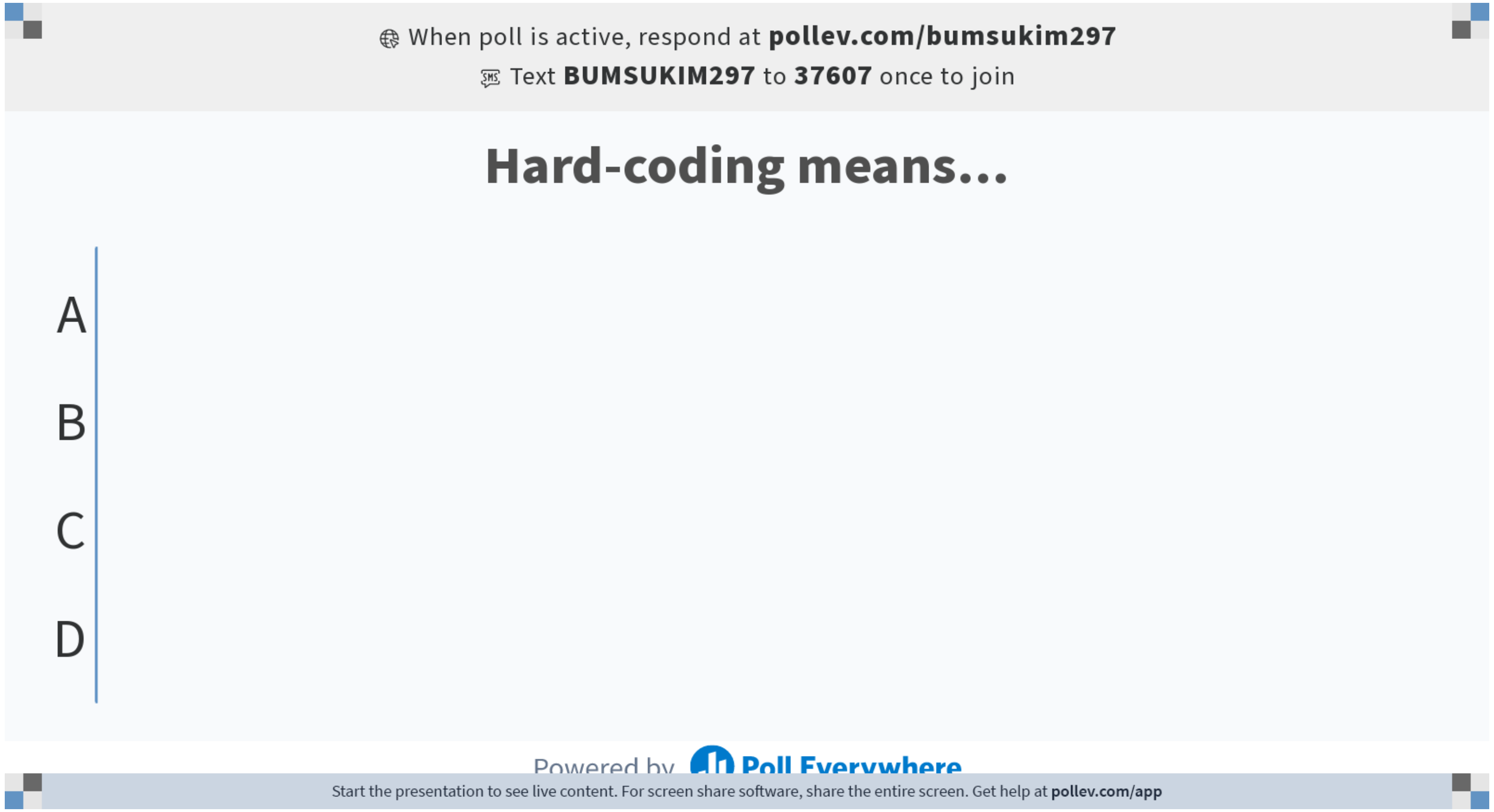
○ None of the above.

A) B, C, E, F

Quiz #4

- Q) Which of the following choices most accurately define the term *hard-coding*?

  A. The practice of coding under hard, rigid principles.
  B. Putting something into your code, instead of taking it in as an input.
  C. Coding in an unnecessary complicated, hard way when an easy alternative is available.
  D. None of the above.



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Hard-coding means...

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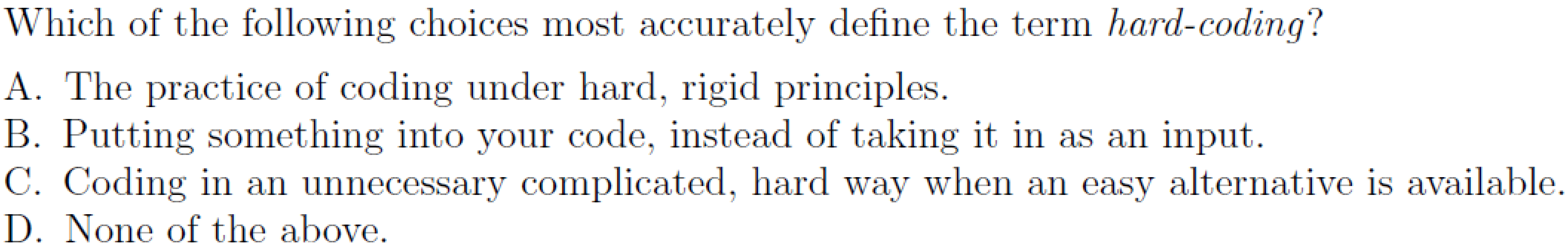
Quiz #4

- Q)



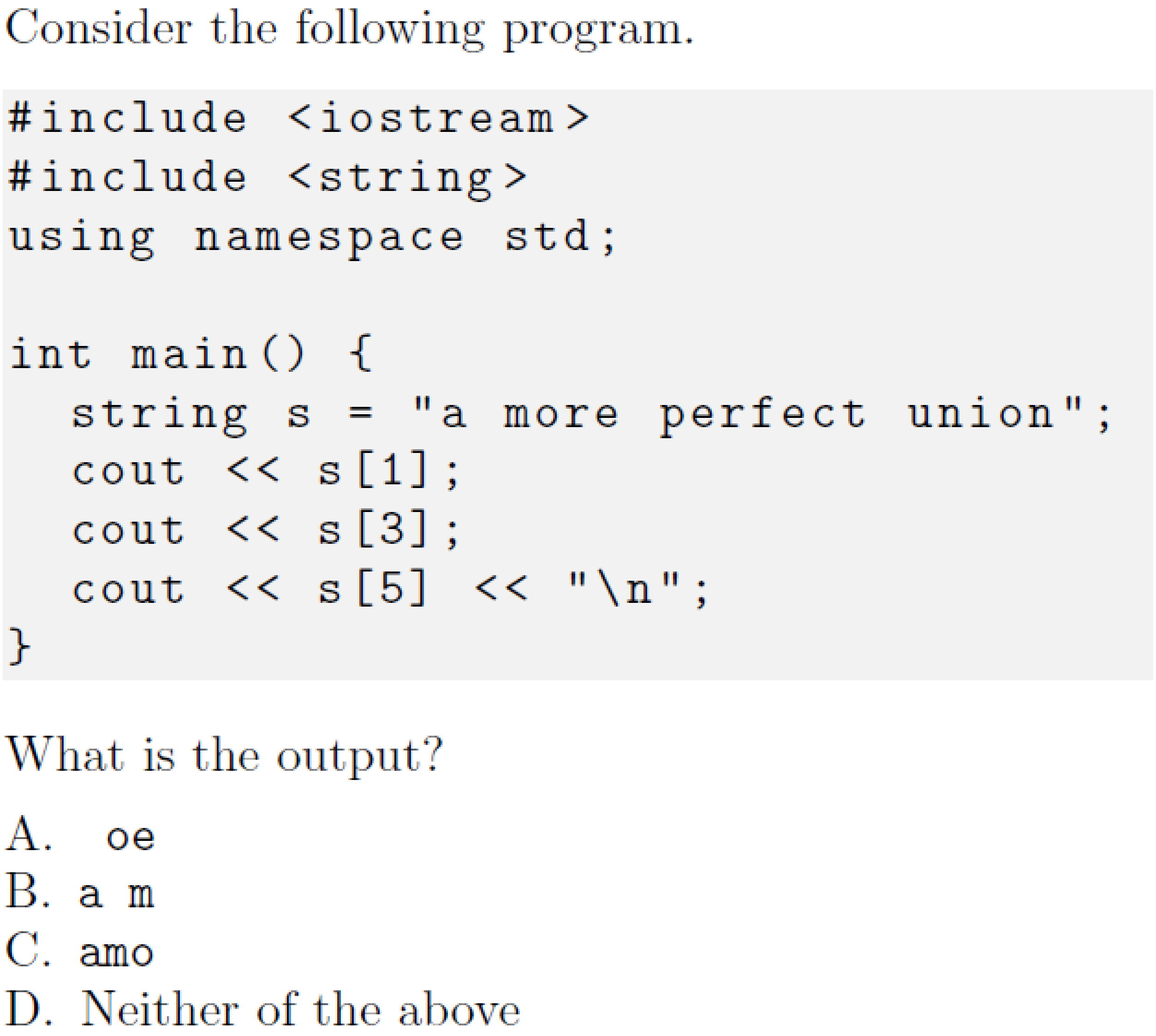
Which of the following choices most accurately define the term *hard-coding*?

A. The practice of coding under hard, rigid principles.
B. Putting something into your code, instead of taking it in as an input.
C. Coding in an unnecessary complicated, hard way when an easy alternative is available.
D. None of the above.

- A) B.
- Avoid hard-coding unless it’s necessary

Quiz #5

- Q)



Consider the following program.

```
#include <iostream>
#include <string>
using namespace std;

int main() {
  string s = "a more perfect union";
  cout << s[1];
  cout << s[3];
  cout << s[5] << "\n";
}
```

What is the output?

A. oe
B. a m
C. amo
D. Neither of the above

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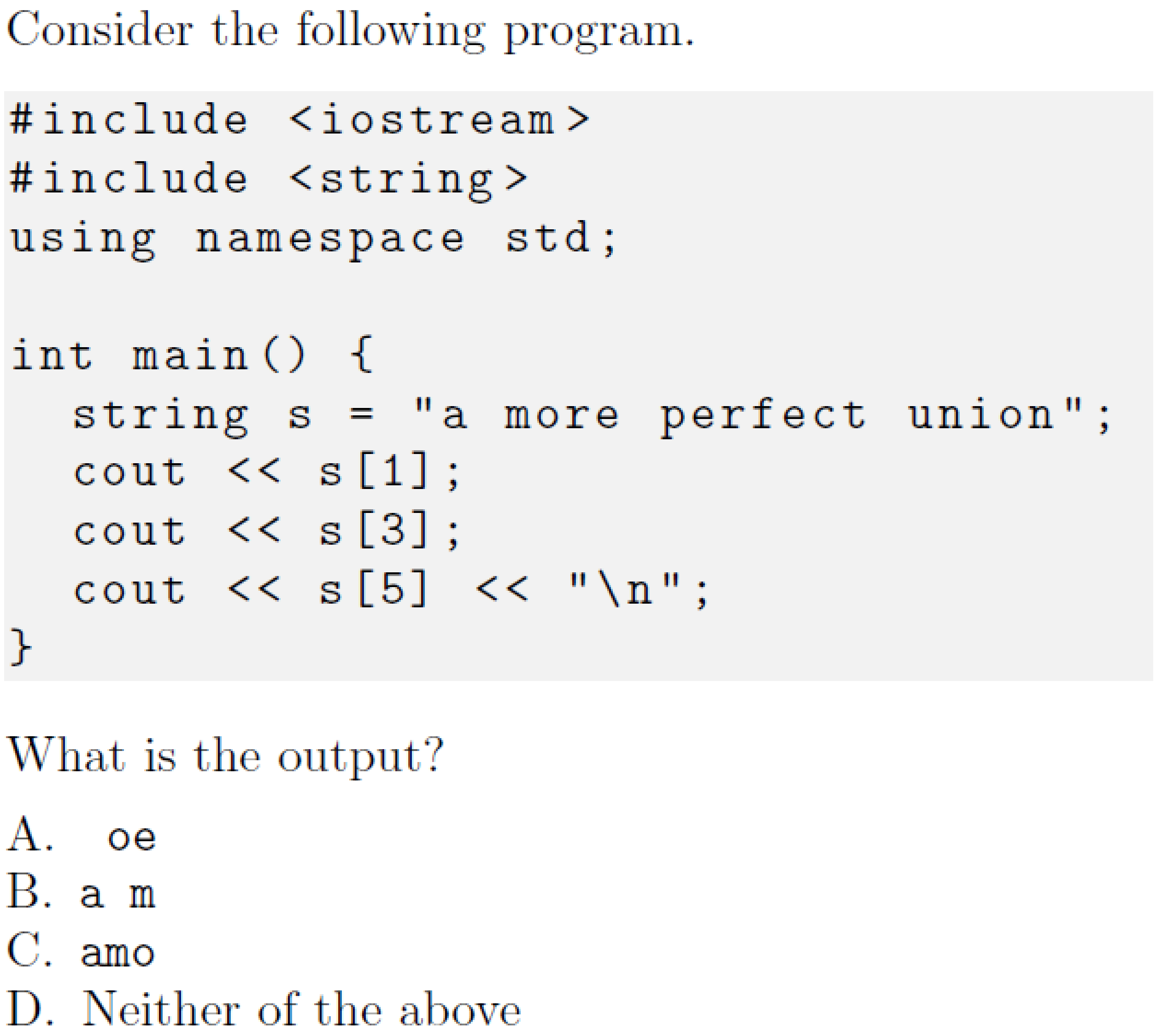
Quiz #5

- Q)



Consider the following program.

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#include <iostream>
#include <string>
using namespace std;

int main() {
  string s = "a more perfect union";
  cout << s[1];
  cout << s[3];
  cout << s[5] << "\n";
}
```

What is the output?

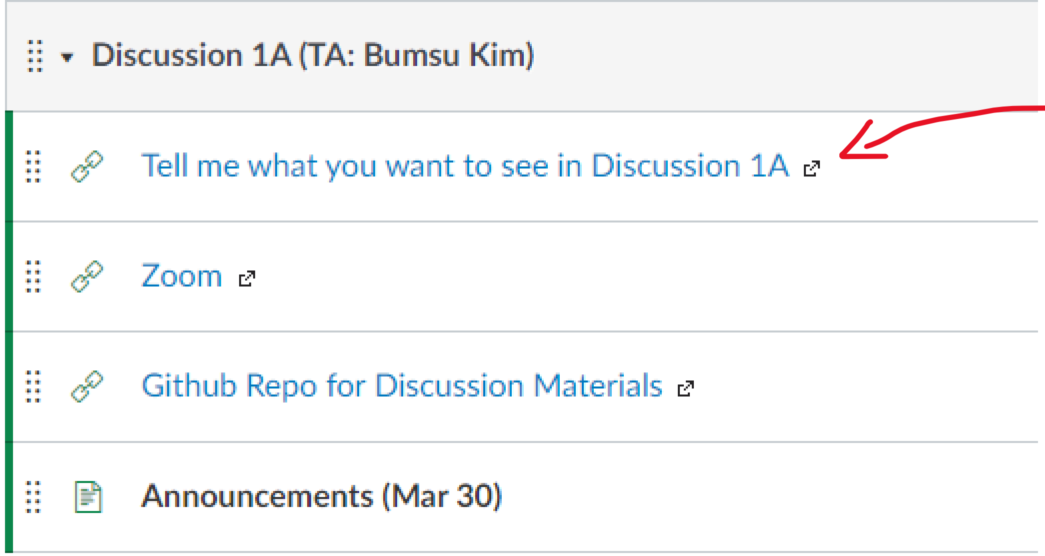
A. oe
B. a m
C. amo
D. Neither of the above

A) A.

C++ indexing always starts from 0

Your Feedback is welcome

- Don’t hesitate to give a feedback on the discussion
- You can use a link in BruinLearn (Google Form)



Discussion 1A (TA: Bumsu Kim)

Tell me what you want to see in Discussion 1A

Zoom

Github Repo for Discussion Materials

Announcements (Mar 30)

Click this link