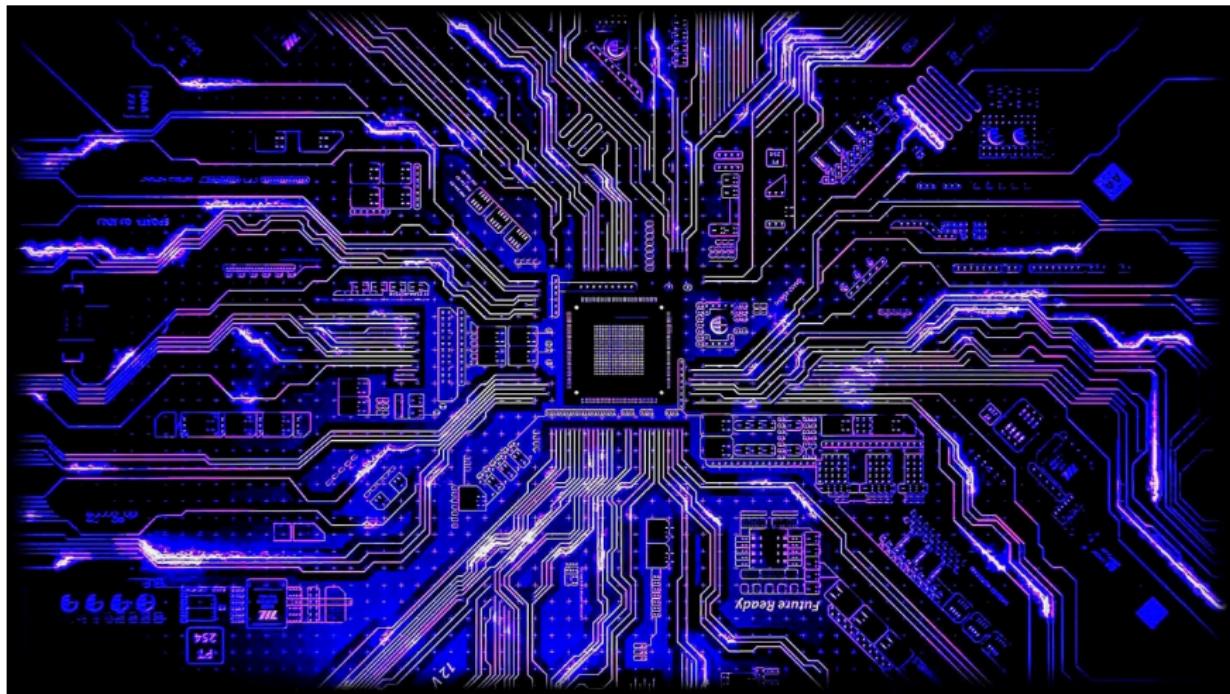


# CSci 127: Introduction to Computer Science



[hunter.cuny.edu/csci](http://hunter.cuny.edu/csci)

# Frequently Asked Questions

From email and tutoring.

- **I have a conflict with the final– what should I do?**

# Frequently Asked Questions

From email and tutoring.

- **I have a conflict with the final– what should I do?**

*Please email me to let me know so we can work something out!*

# Frequently Asked Questions

From email and tutoring.

- **I have a conflict with the final– what should I do?**

*Please email me to let me know so we can work something out!*

- **I want to learn more– what should I take next?**

# Frequently Asked Questions

From email and tutoring.

- **I have a conflict with the final– what should I do?**

*Please email me to let me know so we can work something out!*

- **I want to learn more– what should I take next?**

► Majors: *CSci 135 (Software Design and Analysis in C++) & CSci 150 (Discrete Structures)*

# Frequently Asked Questions

From email and tutoring.

- **I have a conflict with the final– what should I do?**

*Please email me to let me know so we can work something out!*

- **I want to learn more– what should I take next?**

- ▶ Majors: *CSci 135 (Software Design and Analysis in C++) & CSci 150 (Discrete Structures)*
- ▶ Minors: *CSci 133 (More Python) & CSci 232 (Databases)*

# A few words on Academic Integrity

From our Syllabus.

**Hunter College regards acts of academic dishonesty (e.g., plagiarism, cheating on examinations, obtaining unfair advantage, and falsification of records and official documents) as serious offenses against the values of intellectual honesty. The College is committed to enforcing the CUNY Policy on Academic Integrity and will pursue cases of academic dishonesty according to the Hunter College Academic Integrity Procedures. All incidents of cheating will be reported to the Office of Student Conduct in the Vice President for Student Affairs and Dean of Students office.**

# A few words on Academic Integrity

From our Syllabus.

**Hunter College regards acts of academic dishonesty (e.g., plagiarism, cheating on examinations, obtaining unfair advantage, and falsification of records and official documents) as serious offenses against the values of intellectual honesty. The College is committed to enforcing the CUNY Policy on Academic Integrity and will pursue cases of academic dishonesty according to the Hunter College Academic Integrity Procedures. All incidents of cheating will be reported to the Office of Student Conduct in the Vice President for Student Affairs and Dean of Students office.**

- *All suspected cases of cheating on the final exam (e.g. answer for a different version of the exam) will be reported.*

# A few words on Academic Integrity

From our Syllabus.

**Hunter College regards acts of academic dishonesty (e.g., plagiarism, cheating on examinations, obtaining unfair advantage, and falsification of records and official documents) as serious offenses against the values of intellectual honesty. The College is committed to enforcing the CUNY Policy on Academic Integrity and will pursue cases of academic dishonesty according to the Hunter College Academic Integrity Procedures. All incidents of cheating will be reported to the Office of Student Conduct in the Vice President for Student Affairs and Dean of Students office.**

- *All suspected cases of cheating on the final exam (e.g. answer for a different version of the exam) will be reported.*
- *Students will get a PEN grade until the investigation is complete. This may delay registration.*

# A few words on Academic Integrity

From our Syllabus.

**Hunter College regards acts of academic dishonesty (e.g., plagiarism, cheating on examinations, obtaining unfair advantage, and falsification of records and official documents) as serious offenses against the values of intellectual honesty. The College is committed to enforcing the CUNY Policy on Academic Integrity and will pursue cases of academic dishonesty according to the Hunter College Academic Integrity Procedures. All incidents of cheating will be reported to the Office of Student Conduct in the Vice President for Student Affairs and Dean of Students office.**

- *All suspected cases of cheating on the final exam (e.g. answer for a different version of the exam) will be reported.*
- *Students will get a PEN grade until the investigation is complete. This may delay registration.*
- *If the student is found in violation by the Office of Student Conduct, they will receive a 0 on the exam, which also means they will fail the class.*

# Today's Topics



- Recap: Incrementer Design Challenge
- C++: Basic Format & Variables
- I/O and Definite Loops in C++
- More Info on the Final Exam

# Today's Topics



- **Recap: Incrementer Design Challenge**
- C++: Basic Format & Variables
- I/O and Definite Loops in C++
- More Info on the Final Exam

# Recap: Design Challenge: Incrementers



- Simplest arithmetic: add one (“increment”) a variable.

# Recap: Design Challenge: Incrementers



- Simplest arithmetic: add one (“increment”) a variable.
- Example: Increment a decimal number:

# Recap: Design Challenge: Incrementers



- Simplest arithmetic: add one (“increment”) a variable.
- Example: Increment a decimal number:

```
def addOne(n):  
    m = n+1  
    return(m)
```

# Recap: Design Challenge: Incrementers



- Simplest arithmetic: add one (“increment”) a variable.
- Example: Increment a decimal number:

```
def addOne(n):  
    m = n+1  
    return(m)
```

- Challenge: Write an algorithm for incrementing numbers expressed as words.

# Recap: Design Challenge: Incrementers



- Simplest arithmetic: add one ("increment") a variable.
- Example: Increment a decimal number:

```
def addOne(n):  
    m = n+1  
    return(m)
```

- Challenge: Write an algorithm for incrementing numbers expressed as words.  
Example: "forty one" → "forty two"

# Recap: Design Challenge: Incrementers



- Simplest arithmetic: add one ("increment") a variable.
- Example: Increment a decimal number:

```
def addOne(n):  
    m = n+1  
    return(m)
```

- Challenge: Write an algorithm for incrementing numbers expressed as words.  
Example: "forty one" → "forty two"

*Hint: Convert to numbers, increment, and convert back to strings.*

# Recap: Design Challenge: Incrementers



- Simplest arithmetic: add one ("increment") a variable.
- Example: Increment a decimal number:

```
def addOne(n):  
    m = n+1  
    return(m)
```

- Challenge: Write an algorithm for incrementing numbers expressed as words.  
Example: "forty one" → "forty two"  
*Hint: Convert to numbers, increment, and convert back to strings.*
- Challenge: Write an algorithm for incrementing binary numbers.

# Recap: Design Challenge: Incrementers



- Simplest arithmetic: add one ("increment") a variable.
- Example: Increment a decimal number:

```
def addOne(n):  
    m = n+1  
    return(m)
```

- Challenge: Write an algorithm for incrementing numbers expressed as words.

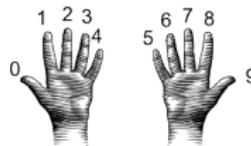
Example: "forty one" → "forty two"

*Hint: Convert to numbers, increment, and convert back to strings.*

- Challenge: Write an algorithm for incrementing binary numbers.

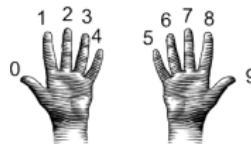
Example: "1001" → "1010"

# Recap: Incrementer Design Challenge



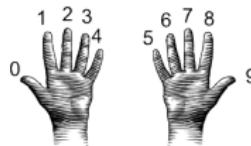
- Challenge: Write an algorithm for incrementing numbers expressed as words. Example: "forty one" → "forty two"

# Recap: Incrementer Design Challenge



- Challenge: Write an algorithm for incrementing numbers expressed as words. Example: "forty one" → "forty two"
- Challenge: Write an algorithm for incrementing binary numbers. Example: "1001" → "1010"
- Hint: Convert to numbers, increment, and convert back to strings.

# Recap: Incrementer Design Challenge

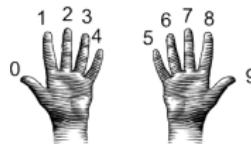


- Challenge: Write an algorithm for incrementing numbers expressed as words. Example: "forty one" → "forty two"
- Challenge: Write an algorithm for incrementing binary numbers. Example: "1001" → "1010"
- Hint: Convert to numbers, increment, and convert back to strings.*

Pseudocode same for both questions:

- ① Get user input.

# Recap: Incrementer Design Challenge

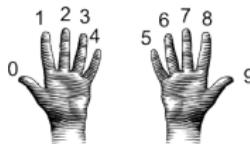


- Challenge: Write an algorithm for incrementing numbers expressed as words. Example: "forty one" → "forty two"
- Challenge: Write an algorithm for incrementing binary numbers. Example: "1001" → "1010"
- Hint: Convert to numbers, increment, and convert back to strings.*

Pseudocode same for both questions:

- ① Get user input.
- ② Convert to standard decimal number.

# Recap: Incrementer Design Challenge

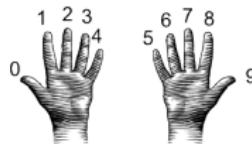


- Challenge: Write an algorithm for incrementing numbers expressed as words. Example: "forty one" → "forty two"
- Challenge: Write an algorithm for incrementing binary numbers. Example: "1001" → "1010"
- Hint: Convert to numbers, increment, and convert back to strings.*

Pseudocode same for both questions:

- ① Get user input.
- ② Convert to standard decimal number.
- ③ Add one (increment) the standard decimal number.

# Recap: Incrementer Design Challenge

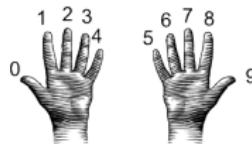


- Challenge: Write an algorithm for incrementing numbers expressed as words. Example: "forty one" → "forty two"
- Challenge: Write an algorithm for incrementing binary numbers. Example: "1001" → "1010"
- Hint: Convert to numbers, increment, and convert back to strings.*

Pseudocode same for both questions:

- ① Get user input.
- ② Convert to standard decimal number.
- ③ Add one (increment) the standard decimal number.
- ④ Convert back to your format.

# Recap: Incrementer Design Challenge

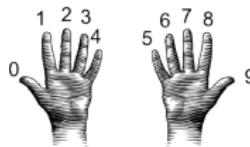


- Challenge: Write an algorithm for incrementing numbers expressed as words. Example: "forty one" → "forty two"
- Challenge: Write an algorithm for incrementing binary numbers. Example: "1001" → "1010"
- Hint: Convert to numbers, increment, and convert back to strings.*

Pseudocode same for both questions:

- ① Get user input.
- ② Convert to standard decimal number.
- ③ Add one (increment) the standard decimal number.
- ④ Convert back to your format.
- ⑤ Print the result.

# Recap: Incrementer Design Challenge

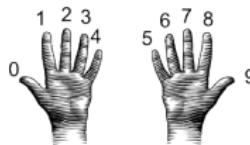


- Challenge: Write an algorithm for incrementing numbers expressed as words. Example: "forty one" → "forty two"
- Challenge: Write an algorithm for incrementing binary numbers. Example: "1001" → "1010"

Pseudocode same for both questions:

- ① Get user input: "forty one"

# Recap: Incrementer Design Challenge

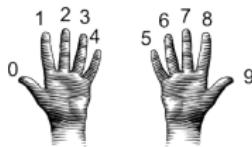


- Challenge: Write an algorithm for incrementing numbers expressed as words. Example: "forty one" → "forty two"
- Challenge: Write an algorithm for incrementing binary numbers. Example: "1001" → "1010"

Pseudocode same for both questions:

- ① Get user input: "forty one"
- ② Convert to standard decimal number: 41

# Recap: Incrementer Design Challenge

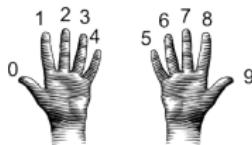


- Challenge: Write an algorithm for incrementing numbers expressed as words. Example: "forty one" → "forty two"
- Challenge: Write an algorithm for incrementing binary numbers. Example: "1001" → "1010"

Pseudocode same for both questions:

- ① Get user input: "forty one"
- ② Convert to standard decimal number: 41
- ③ Add one (increment) the standard decimal number: 42

# Recap: Incrementer Design Challenge

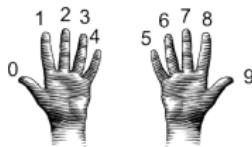


- Challenge: Write an algorithm for incrementing numbers expressed as words. Example: "forty one" → "forty two"
- Challenge: Write an algorithm for incrementing binary numbers. Example: "1001" → "1010"

Pseudocode same for both questions:

- ① Get user input: "forty one"
- ② Convert to standard decimal number: 41
- ③ Add one (increment) the standard decimal number: 42
- ④ Convert back to your format: "forty two"

# Recap: Incrementer Design Challenge

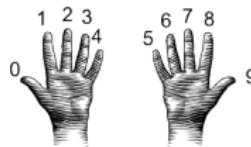


- Challenge: Write an algorithm for incrementing numbers expressed as words. Example: "forty one" → "forty two"
- Challenge: Write an algorithm for incrementing binary numbers. Example: "1001" → "1010"

Pseudocode same for both questions:

- ① Get user input: "forty one"
- ② Convert to standard decimal number: 41
- ③ Add one (increment) the standard decimal number: 42
- ④ Convert back to your format: "forty two"
- ⑤ Print the result.

# Recap: Incrementer Design Challenge

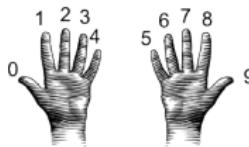


- Challenge: Write an algorithm for incrementing numbers expressed as words. Example: "forty one" → "forty two"
- Challenge: Write an algorithm for incrementing binary numbers. Example: "1001" → "1010"

Pseudocode same for both questions:

- ① Get user input: "1001"

# Recap: Incrementer Design Challenge

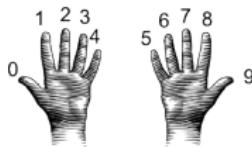


- Challenge: Write an algorithm for incrementing numbers expressed as words. Example: "forty one" → "forty two"
- Challenge: Write an algorithm for incrementing binary numbers. Example: "1001" → "1010"

Pseudocode same for both questions:

- ① Get user input: "1001"
- ② Convert to standard decimal number: 9

# Recap: Incrementer Design Challenge

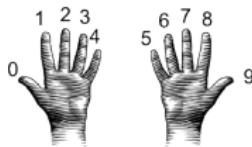


- Challenge: Write an algorithm for incrementing numbers expressed as words. Example: "forty one" → "forty two"
- Challenge: Write an algorithm for incrementing binary numbers. Example: "1001" → "1010"

Pseudocode same for both questions:

- ① Get user input: "1001"
- ② Convert to standard decimal number: 9
- ③ Add one (increment) the standard decimal number: 10

# Recap: Incrementer Design Challenge

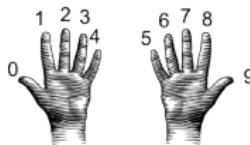


- Challenge: Write an algorithm for incrementing numbers expressed as words. Example: "forty one" → "forty two"
- Challenge: Write an algorithm for incrementing binary numbers. Example: "1001" → "1010"

Pseudocode same for both questions:

- ① Get user input: "1001"
- ② Convert to standard decimal number: 9
- ③ Add one (increment) the standard decimal number: 10
- ④ Convert back to your format: "1010"

# Recap: Incrementer Design Challenge

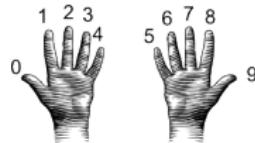


- Challenge: Write an algorithm for incrementing numbers expressed as words. Example: "forty one" → "forty two"
- Challenge: Write an algorithm for incrementing binary numbers. Example: "1001" → "1010"

Pseudocode same for both questions:

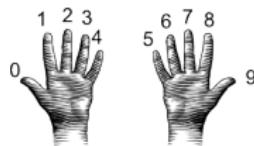
- ① Get user input: "1001"
- ② Convert to standard decimal number: 9
- ③ Add one (increment) the standard decimal number: 10
- ④ Convert back to your format: "1010"
- ⑤ Print the result.

# Recap: Incrementer Design Challenge



Focus on: Convert to standard decimal number:

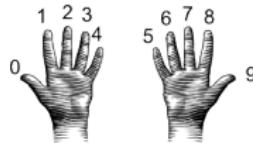
# Recap: Incrementer Design Challenge



Focus on: Convert to standard decimal number:

```
def convert2Decimal(numString):
```

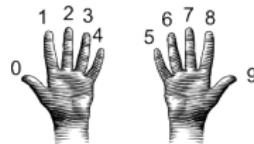
# Recap: Incrementer Design Challenge



Focus on: Convert to standard decimal number:

```
def convert2Decimal(numString):  
    #Start with one-digit numbers: zero,one,...,nine
```

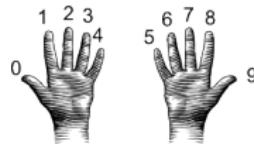
# Recap: Incrementer Design Challenge



Focus on: Convert to standard decimal number:

```
def convert2Decimal(numString):
    #Start with one-digit numbers: zero,one,...,nine
    if numString == "zero":
        return(0)
```

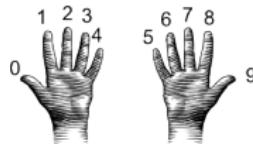
# Recap: Incrementer Design Challenge



Focus on: Convert to standard decimal number:

```
def convert2Decimal(numString):
    #Start with one-digit numbers: zero,one,...,nine
    if numString == "zero":
        return(0)
    elif numString == "one":
        return(1)
```

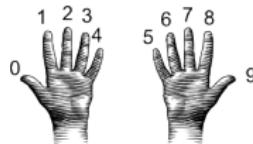
# Recap: Incrementer Design Challenge



Focus on: Convert to standard decimal number:

```
def convert2Decimal(numString):
    #Start with one-digit numbers: zero,one,...,nine
    if numString == "zero":
        return(0)
    elif numString == "one":
        return(1)
    elif numString == "two":
        return(2)
```

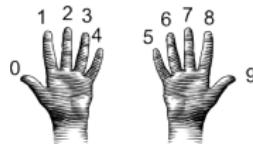
# Recap: Incrementer Design Challenge



Focus on: Convert to standard decimal number:

```
def convert2Decimal(numString):
    #Start with one-digit numbers: zero,one,...,nine
    if numString == "zero":
        return(0)
    elif numString == "one":
        return(1)
    elif numString == "two":
        return(2)
    else:
        return(9)
```

# Recap: Incrementer Design Challenge

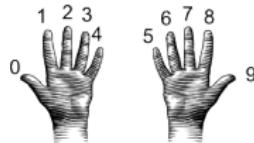


Focus on: Convert to standard decimal number:

```
def convert2Decimal(numString):
    #Start with one-digit numbers: zero,one,...,nine
    if numString == "zero":
        return(0)
    elif numString == "one":
        return(1)
    elif numString == "two":
        return(2)
    else:
        return(9)
```

Will this work?

# Unit Testing: Incrementer Design Challenge

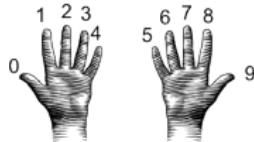


Focus on: Convert to standard decimal number:

```
def convert2Decimal(numString):
    #Start with one-digit numbers: zero,one,...,nine
    if numString == "zero":
        return(0)
    elif numString == "one":
        return(1)
    elif numString == "two":
        return(2)
    else:
        return(9)
```

Will this work? What inputs would find the error(s)?

# Unit Testing: Incrementer Design Challenge



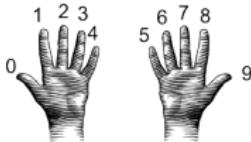
Focus on: Convert to standard decimal number:

```
def convert2Decimal(numString):
    #Start with one-digit numbers: zero,one,...,nine
    if numString == "zero":
        return(0)
    elif numString == "one":
        return(1)
    elif numString == "two":
        return(2)
    else:
        return(9)
```

Will this work? What inputs would find the error(s)?

Unit Testing: testing individual units/functions/blocks of code to verify correctness.

# Unit Testing: Incrementer Design Challenge



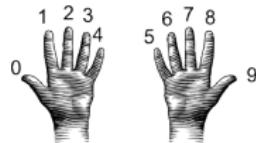
Focus on: Convert to standard decimal number:

```
def convert2Decimal(numString):
    #Start with one-digit numbers: zero,one,...,nine
    if numString == "zero":
        return(0)
    elif numString == "one":
        return(1)
    elif numString == "two":
        return(2)
    else:
        return(9)
```

Will this work? What inputs would find the error(s)?

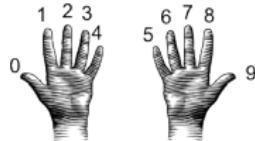
Unit Testing: testing individual units/functions/blocks of code to verify correctness. Often automated (e.g. gradescope).

# Unit Testing: Incrementer Design Challenge



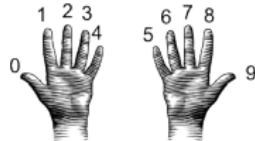
- **Unit Testing:** testing individual units/functions/blocks of code to verify correctness. Often automated (e.g. gradescope).
- To test all branches of code, would need to test all inputs: "zero", "one",..., "nine", & some bad inputs.

# Unit Testing: Incrementer Design Challenge



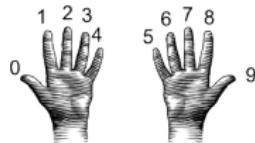
- **Unit Testing:** testing individual units/functions/blocks of code to verify correctness. Often automated (e.g. gradescope).
- To test all branches of code, would need to test all inputs: "zero", "one", ..., "nine", & some bad inputs.  
Also important to test **edge cases**.

# Unit Testing: Incrementer Design Challenge



- **Unit Testing:** testing individual units/functions/blocks of code to verify correctness. Often automated (e.g. gradescope).
- To test all branches of code, would need to test all inputs: "zero", "one", ..., "nine", & some bad inputs.  
Also important to test **edge cases**.
- If large, design automated tests that will “cover” as many branches as possible and use randomly generated inputs:

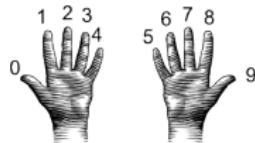
# Unit Testing: Incrementer Design Challenge



- **Unit Testing:** testing individual units/functions/blocks of code to verify correctness. Often automated (e.g. gradescope).
- To test all branches of code, would need to test all inputs: "zero", "one", ..., "nine", & some bad inputs.  
Also important to test **edge cases**.
- If large, design automated tests that will “cover” as many branches as possible and use randomly generated inputs:

```
names = ["zero", "one", ..., "nine"]
```

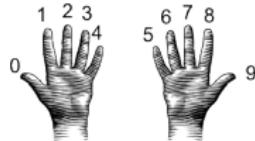
# Unit Testing: Incrementer Design Challenge



- **Unit Testing:** testing individual units/functions/blocks of code to verify correctness. Often automated (e.g. gradescope).
- To test all branches of code, would need to test all inputs: "zero", "one", ..., "nine", & some bad inputs.  
Also important to test **edge cases**.
- If large, design automated tests that will "cover" as many branches as possible and use randomly generated inputs:

```
names = ["zero", "one", ..., "nine"]  
x = random.randrange(10)
```

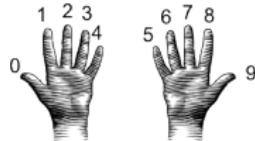
# Unit Testing: Incrementer Design Challenge



- **Unit Testing:** testing individual units/functions/blocks of code to verify correctness. Often automated (e.g. gradescope).
- To test all branches of code, would need to test all inputs: "zero", "one", ..., "nine", & some bad inputs.  
Also important to test **edge cases**.
- If large, design automated tests that will "cover" as many branches as possible and use randomly generated inputs:

```
names = ["zero", "one", ..., "nine"]
x = random.randrange(10)
if x == convert2Decimal(names[x]):
```

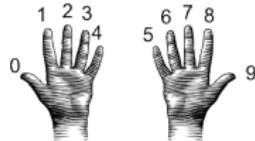
# Unit Testing: Incrementer Design Challenge



- **Unit Testing:** testing individual units/functions/blocks of code to verify correctness. Often automated (e.g. gradescope).
- To test all branches of code, would need to test all inputs: "zero", "one", ..., "nine", & some bad inputs.  
Also important to test **edge cases**.
- If large, design automated tests that will "cover" as many branches as possible and use randomly generated inputs:

```
names = ["zero", "one", ..., "nine"]
x = random.randrange(10)
if x == convert2Decimal(names[x]):
    #PASS
```

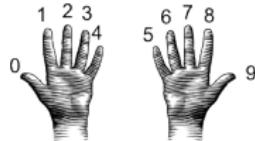
# Unit Testing: Incrementer Design Challenge



- **Unit Testing:** testing individual units/functions/blocks of code to verify correctness. Often automated (e.g. gradescope).
- To test all branches of code, would need to test all inputs: "zero", "one", ..., "nine", & some bad inputs.  
Also important to test **edge cases**.
- If large, design automated tests that will "cover" as many branches as possible and use randomly generated inputs:

```
names = ["zero", "one", ..., "nine"]
x = random.randrange(10)
if x == convert2Decimal(names[x]):
    #PASS
else:
```

# Unit Testing: Incrementer Design Challenge



- **Unit Testing:** testing individual units/functions/blocks of code to verify correctness. Often automated (e.g. gradescope).
- To test all branches of code, would need to test all inputs: "zero", "one", ..., "nine", & some bad inputs.  
Also important to test **edge cases**.
- If large, design automated tests that will "cover" as many branches as possible and use randomly generated inputs:

```
names = ["zero", "one", ..., "nine"]
x = random.randrange(10)
if x == convert2Decimal(names[x]):
    #PASS
else:
    #FAIL
```

# Today's Topics



- Recap: Incrementer Design Challenge
- **C++: Basic Format & Variables**
- I/O and Definite Loops in C++
- More Info on the Final Exam

# Challenge:

- Using what you know from Python, predict what the C++ code will do:

```
1 //Another C++ program, demonstrating variables
2 #include <iostream>
3 using namespace std;
4
5 int main ()
6 {
7     int year;
8     cout << "Enter a number: ";
9     cin >> year;
10    cout << "Hello " << year << "!!\n\n";
11    return 0;
12 }
```

# onlinegdb demo

```
1 //Another C++ program, demonstrating variables
2 #include <iostream>
3 using namespace std;
4
5 int main ()
6 {
7     int year;
8     cout << "Enter a number: ";
9     cin >> year;
10    cout << "Hello " << year << "!!\n\n";
11    return 0;
12 }
```

(Demo with onlinegdb)

# Introduction to C++

- C++ is a popular programming language that extends C.

```
1 //Another C++ program, demonstrating variables
2 #include <iostream>
3 using namespace std;
4
5 int main ()
6 {
7     int year;
8     cout << "Enter a number: ";
9     cin >> year;
10    cout << "Hello " << year << "!!\n\n";
11    return 0;
12 }
```

# Introduction to C++

- C++ is a popular programming language that extends C.
- Fast, efficient, and powerful.

```
1 //Another C++ program, demonstrating variables
2 #include <iostream>
3 using namespace std;
4
5 int main ()
6 {
7     int year;
8     cout << "Enter a number: ";
9     cin >> year;
10    cout << "Hello " << year << "!!\n\n";
11    return 0;
12 }
```

# Introduction to C++

```
1 //Another C++ program, demonstrating variables
2 #include <iostream>
3 using namespace std;
4
5 int main ()
6 {
7     int year;
8     cout << "Enter a number: ";
9     cin >> year;
10    cout << "Hello " << year << "!!\n\n";
11    return 0;
12 }
```

- C++ is a popular programming language that extends C.
- Fast, efficient, and powerful.
- Used for systems programming (and future courses!).

# Introduction to C++

```
1 //Another C++ program, demonstrating variables
2 #include <iostream>
3 using namespace std;
4
5 int main ()
6 {
7     int year;
8     cout << "Enter a number: ";
9     cin >> year;
10    cout << "Hello " << year << "!!\n\n";
11    return 0;
12 }
```

- C++ is a popular programming language that extends C.
- Fast, efficient, and powerful.
- Used for systems programming (and future courses!).
- Today, we'll introduce the basic structure and simple input/output (I/O) in C/C++.

# Introduction to C++

- Programs are organized in functions.

```
1 //Another C++ program, demonstrating variables
2 #include <iostream>
3 using namespace std;
4
5 int main ()
6 {
7     int year;
8     cout << "Enter a number: ";
9     cin >> year;
10    cout << "Hello " << year << "!!\n\n";
11    return 0;
12 }
```

# Introduction to C++

- Programs are organized in functions.

```
1 //Another C++ program, demonstrating variables
2 #include <iostream>
3 using namespace std;
4
5 int main ()
6 {
7     int year;
8     cout << "Enter a number: ";
9     cin >> year;
10    cout << "Hello " << year << "!!\n\n";
11    return 0;
12 }
```

Example:

# Introduction to C++

- Programs are organized in functions.

```
1 //Another C++ program, demonstrating variables
2 #include <iostream>
3 using namespace std;
4
5 int main ()
6 {
7     int year;
8     cout << "Enter a number: ";
9     cin >> year;
10    cout << "Hello " << year << "!!\n\n";
11    return 0;
12 }
```

Example:

```
int main()
```

# Introduction to C++

- Programs are organized in functions.

```
1 //Another C++ program, demonstrating variables
2 #include <iostream>
3 using namespace std;
4
5 int main ()
6 {
7     int year;
8     cout << "Enter a number: ";
9     cin >> year;
10    cout << "Hello " << year << "!!\n\n";
11    return 0;
12 }
```

Example:

```
int main()
{
```

# Introduction to C++

- Programs are organized in functions.

```
1 //Another C++ program, demonstrating variables
2 #include <iostream>
3 using namespace std;
4
5 int main ()
6 {
7     int year;
8     cout << "Enter a number: ";
9     cin >> year;
10    cout << "Hello " << year << "!!\n\n";
11    return 0;
12 }
```

Example:

```
int main()
{
    cout << "Hello world!";
    return(0);
}
```

# Introduction to C++

- Programs are organized in functions.

```
1 //Another C++ program, demonstrating variables
2 #include <iostream>
3 using namespace std;
4
5 int main ()
6 {
7     int year;
8     cout << "Enter a number: ";
9     cin >> year;
10    cout << "Hello " << year << "!!\n\n";
11    return 0;
12 }
```

# Introduction to C++

- Programs are organized in functions.
- Variables must be **declared**:

```
1 //Another C++ program, demonstrating variables
2 #include <iostream>
3 using namespace std;
4
5 int main ()
6 {
7     int year;
8     cout << "Enter a number: ";
9     cin >> year;
10    cout << "Hello " << year << "!!\n\n";
11    return 0;
12 }
```

# Introduction to C++

- Programs are organized in functions.
- Variables must be **declared**:  
`int num;`

```
1 //Another C++ program, demonstrating variables
2 #include <iostream>
3 using namespace std;
4
5 int main ()
6 {
7     int year;
8     cout << "Enter a number: ";
9     cin >> year;
10    cout << "Hello " << year << "!!\n\n";
11    return 0;
12 }
```

# Introduction to C++

- Programs are organized in functions.
- Variables must be **declared**:  
`int num;`
- Many types available:  
`int, float, char, ...`

```
1 //Another C++ program, demonstrating variables
2 #include <iostream>
3 using namespace std;
4
5 int main ()
6 {
7     int year;
8     cout << "Enter a number: ";
9     cin >> year;
10    cout << "Hello " << year << "!!\n\n";
11    return 0;
12 }
```

# Introduction to C++

- Programs are organized in functions.
- Variables must be **declared**:  
`int num;`
- Many types available:  
`int, float, char, ...`
- Semicolons separate commands:

```
1 //Another C++ program, demonstrating variables
2 #include <iostream>
3 using namespace std;
4
5 int main ()
6 {
7     int year;
8     cout << "Enter a number: ";
9     cin >> year;
10    cout << "Hello " << year << "!!\n\n";
11    return 0;
12 }
```

# Introduction to C++

- Programs are organized in functions.
- Variables must be **declared**:  
`int num;`
- Many types available:  
`int, float, char, ...`
- Semicolons separate commands:  
`num = 5; more = 2*num;`

```
1 //Another C++ program, demonstrating variables
2 #include <iostream>
3 using namespace std;
4
5 int main ()
6 {
7     int year;
8     cout << "Enter a number: ";
9     cin >> year;
10    cout << "Hello " << year << "!!\n\n";
11    return 0;
12 }
```

# Introduction to C++

- Programs are organized in functions.
- Variables must be **declared**:  
`int num;`
- Many types available:  
`int, float, char, ...`
- Semicolons separate commands:  
`num = 5; more = 2*num;`
- To print, we'll use `cout <<`:

```
1 //Another C++ program, demonstrating variables
2 #include <iostream>
3 using namespace std;
4
5 int main ()
6 {
7     int year;
8     cout << "Enter a number: ";
9     cin >> year;
10    cout << "Hello " << year << "!!\n\n";
11    return 0;
12 }
```

# Introduction to C++

- Programs are organized in functions.
- Variables must be **declared**:  
`int num;`
- Many types available:  
`int, float, char, ...`
- Semicolons separate commands:  
`num = 5; more = 2*num;`
- To print, we'll use `cout <<`:  
`cout << "Hello!!";`

```
1 //Another C++ program, demonstrating variables
2 #include <iostream>
3 using namespace std;
4
5 int main ()
6 {
7     int year;
8     cout << "Enter a number: ";
9     cin >> year;
10    cout << "Hello " << year << "!!\n\n";
11    return 0;
12 }
```

# Introduction to C++

- Programs are organized in functions.
- Variables must be **declared**:

```
int num;
```
- Many types available:

```
int, float, char, ...
```
- Semicolons separate commands:

```
num = 5; more = 2*num;
```
- To print, we'll use `cout <<`:

```
cout << "Hello!!";
```
- To get input, we'll use `cin >>`:

```
1 //Another C++ program, demonstrating variables
2 #include <iostream>
3 using namespace std;
4
5 int main ()
6 {
7     int year;
8     cout << "Enter a number: ";
9     cin >> year;
10    cout << "Hello " << year << "!!\n\n";
11    return 0;
12 }
```

# Introduction to C++

- Programs are organized in functions.

- Variables must be **declared**:

```
int num;
```

- Many types available:

```
int, float, char, ...
```

- Semicolons separate commands:

```
num = 5; more = 2*num;
```

- To print, we'll use cout <<:

```
cout << "Hello!!";
```

- To get input, we'll use cin >>:

```
cin >> num;
```

```
1 //Another C++ program, demonstrating variables
2 #include <iostream>
3 using namespace std;
4
5 int main ()
6 {
7     int year;
8     cout << "Enter a number: ";
9     cin >> year;
10    cout << "Hello " << year << "!!\n\n";
11    return 0;
12 }
```

# Introduction to C++

- Programs are organized in functions.

- Variables must be **declared**:

```
int num;
```

- Many types available:

```
int, float, char, ...
```

- Semicolons separate commands:

```
num = 5; more = 2*num;
```

- To print, we'll use cout <<:

```
cout << "Hello!!";
```

- To get input, we'll use cin >>:

```
cin >> num;
```

- To use those I/O functions, we put at the top of the program:

```
1 //Another C++ program, demonstrating variables
2 #include <iostream>
3 using namespace std;
4
5 int main ()
6 {
7     int year;
8     cout << "Enter a number: ";
9     cin >> year;
10    cout << "Hello " << year << "!!\n\n";
11    return 0;
12 }
```

# Introduction to C++

- Programs are organized in functions.

- Variables must be **declared**:

```
int num;
```

- Many types available:

```
int, float, char, ...
```

- Semicolons separate commands:

```
num = 5; more = 2*num;
```

- To print, we'll use cout <<:

```
cout << "Hello!!";
```

- To get input, we'll use cin >>:

```
cin >> num;
```

- To use those I/O functions, we put at the top of the program:

```
#include <iostream>
```

```
using namespace std;
```

```
1 //Another C++ program, demonstrating variables
2 #include <iostream>
3 using namespace std;
4
5 int main ()
6 {
7     int year;
8     cout << "Enter a number: ";
9     cin >> year;
10    cout << "Hello " << year << "!!\n\n";
11
12 }
```

## Challenge:

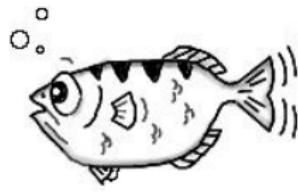
Predict what the following pieces of code will do:

```
//Another C++ program, demonstrating I/O & arithmetic
#include <iostream>
using namespace std;

int main ()
{
    float kg, lbs;
    cout << "Enter kg: ";
    cin >> kg;
    lbs = kg * 2.2;
    cout << endl << "Lbs: " << lbs << "\n\n";
    return 0;
}
```

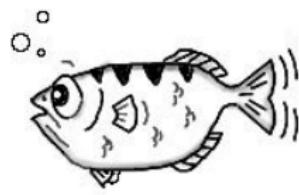
## Side Note: gdb

- Part of Richard Stallman's "GNU is Not Unix" (GNU) project.



[gdb.org](http://gdb.org)

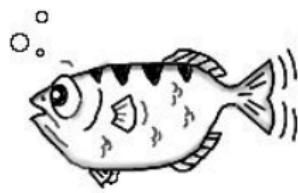
## Side Note: gdb



[gdb.org](http://gdb.org)

- Part of Richard Stallman's "GNU is Not Unix" (GNU) project.
- Written in 1986, gdb is the GNU debugger and based on dbx from the Berkeley Distribution of Unix.

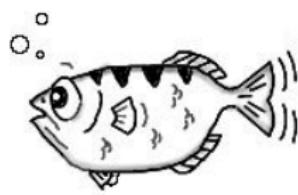
## Side Note: gdb



[gdb.org](http://gdb.org)

- Part of Richard Stallman's "GNU is Not Unix" (GNU) project.
- Written in 1986, gdb is the GNU debugger and based on dbx from the Berkeley Distribution of Unix.
- Lightweight, widely-available program that allows you to "step through" your code line-by-line.

## Side Note: gdb



[gdb.org](http://gdb.org)

- Part of Richard Stallman's "GNU is Not Unix" (GNU) project.
- Written in 1986, gdb is the GNU debugger and based on dbx from the Berkeley Distribution of Unix.
- Lightweight, widely-available program that allows you to "step through" your code line-by-line.
- Available on-line ([onlinegdb.com](http://onlinegdb.com)) or follow installation instructions in Lab 12.

# C++ Demo

```
//Another C++ program, demonstrating I/O & arithmetic
#include <iostream>
using namespace std;

int main ()
{
    float kg, lbs;
    cout << "Enter kg: ";
    cin >> kg;
    lbs = kg * 2.2;
    cout << endl << "Lbs: " << lbs << "\n\n";
    return 0;
}
```

(Demo with onlinedbg)

## Challenge:...

Convert the C++ code to a **Python** program:

```
//Another C++ program, demonstrating I/O & arithmetic
#include <iostream>
using namespace std;

int main ()
{
    float kg, lbs;
    cout << "Enter kg: ";
    cin >> kg;
    lbs = kg * 2.2;
    cout << endl << "Lbs: " << lbs << "\n\n";
    return 0;
}
```

# Python Tutor

Convert the C++ code to a **Python program**:

```
//Another C++ program, demonstrating I/O & arithmetic
#include <iostream>
using namespace std;

int main ()
{
    float kg, lbs;
    cout << "Enter kg: ";
    cin >> kg;
    lbs = kg * 2.2;
    cout << endl << "Lbs: " << lbs << "\n\n";
    return 0;
}
```

(Write from scratch in `pythonTutor`.)

# Lecture Quiz

- Log-in to Gradescope
- Find LECTURE 12 Quiz
- Take the quiz
- **You have 3 minutes**

# Today's Topics



- Recap: Incrementer Design Challenge
- C++: Basic Format & Variables
- **I/O and Definite Loops in C++**
- More Info on the Final Exam

# Challenge:

Predict what the following pieces of code will do:

```
//Another C++ program; Demonstrates loops
#include <iostream>
using namespace std;

int main ()
{
    int i,j;
    for (i = 0; i < 4; i++)
    {
        cout << "The world turned upside down...\n";
    }

    for (j = 10; j > 0; j--)
    {
        cout << j << " ";
    }
    cout << "Blast off!!" << endl;

    return 0;
}
```

# C++ Demo

```
//Another C++ program; Demonstrates loops
#include <iostream>
using namespace std;

int main ()
{
    int i,j;
    for (i = 0; i < 4; i++)
    {
        cout << "The world turned upside down...\n";
    }
    for (j = 10; j > 0; j--)
    {
        cout << j << " ";
    }
    cout << "Blast off!!" << endl;
    return 0;
}
```

(Demo with onlinegdb)

# Definite loops

```
//Another C++ program; Demonstrates loops
#include <iostream>
using namespace std;

int main ()
{
    int i,j;
    for (i = 0; i < 4; i++)
    {
        cout << "The world turned upside down...\n";
    }

    for (j = 10; j > 0; j--)
    {
        cout << j << " ";
    }
    cout << "Blast off!!" << endl;

    return 0;
}
```

General format:

```
for ( initialization ; test ; updateAction )
{
    command1;
    command2;
    command3;
    ...
}
```

# Challenge:

Predict what the following pieces of code will do:

```
//Another C++ program; Demonstrates loops
#include <iostream>
using namespace std;

int main ()
{
    int i,j,size;
    cout << "Enter size: ";
    cin >> size;
    for (i = 0; i < size; i++)
    {
        for (j = 0; j < size; j++)
            cout << "*";
        cout << endl;
    }
    cout << "\n\n";
    for (i = size; i > 0; i--)
    {
        size = 3
        for (j = 0; j < i; j++)
            cout << "*";
        cout << endl;
    }
    return 0;
}
```

size =3

i=0  
j=0,1,2  
\*\*\*  
i=1  
j=0,1,2  
\*\*\*  
i=2  
j=0,1,2  
\*\*\*  
i=3  
j=0,1,2  
\*\*  
\*  
i=2  
j=0,1  
i=1  
j=0

# C++ Demo

```
//Another C++ program; Demonstrates loops
#include <iostream>
using namespace std;

int main ()
{
    int i,j,size;
    cout << "Enter size: ";
    cin >> size;
    for (i = 0; i < size; i++)
    {
        for (j = 0; j < size; j++)
            cout << "*";
        cout << endl;
    }
    cout << "\n\n";
    for (i = size; i > 0; i--)
    {
        for (j = 0; j < i; j++)
            cout << "*";
        cout << endl;
    }
    return 0;
}
```

(Demo with onlinedbg)

# Challenge:

Predict what the following pieces of code will do:

```
//Growth example
#include <iostream>
using namespace std;

int main ()
{
    int population = 100;
    cout << "Year\tPopulation\n";
    for (int year = 0; year < 100; year= year+5)
    {
        cout << year << "\t" << population << "\n";
        population = population * 2;
    }
    return 0;
}
```

Year	Population
0	100
5	200
10	400

# Challenge:

**Translate** the C++ program into Python:

```
//Growth example
#include <iostream>
using namespace std;

int main ()
{
    int population = 100;
    cout << "Year\tPopulation\n";
    for (int year = 0; year < 100; year= year+5)
    {
        cout << year << "\t" << population << "\n";
        population = population * 2;
    }
    return 0;
}
```

# Recap: C++

- C++ is a popular programming language that extends C.



# Recap: C++



- C++ is a popular programming language that extends C.
- Input/Output (I/O):
  - ▶ `cin >>`
  - ▶ `cout <<`

# Recap: C++



- C++ is a popular programming language that extends C.
- Input/Output (I/O):
  - ▶ `cin >>`
  - ▶ `cout <<`
- Definite loops:

```
for (i = 0; i < 10; i++) {  
    ...  
}
```

# Today's Topics



- Recap: Incrementer Design Challenge
- C++: Basic Format & Variables
- I/O and Definite Loops in C++
- **More Info on the Final Exam**

# Final Overview: Format

- Closed book. No electronic devices allowed. If we see your phone we will take it until the end of the exam.

# Final Overview: Format

- Closed book. No electronic devices allowed. If we see your phone we will take it until the end of the exam.
- You can have 1 piece of **8.5" x 11"** paper.

# Final Overview: Format

- Closed book. No electronic devices allowed. If we see your phone we will take it until the end of the exam.
- You can have 1 piece of **8.5" x 11"** paper.
  - ▶ With notes, examples, programs: what will help you on the exam.

# Final Overview: Format

- Closed book. No electronic devices allowed. If we see your phone we will take it until the end of the exam.
- You can have 1 piece of **8.5" x 11"** paper.
  - ▶ With notes, examples, programs: what will help you on the exam.
  - ▶ Best if you design/write yours, it's excellent way to study.

# Final Overview: Format

- Closed book. No electronic devices allowed. If we see your phone we will take it until the end of the exam.
- You can have 1 piece of **8.5" x 11"** paper.
  - ▶ With notes, examples, programs: what will help you on the exam.
  - ▶ Best if you design/write yours, it's excellent way to study.
- The exam format:

# Final Overview: Format

- Closed book. No electronic devices allowed. If we see your phone we will take it until the end of the exam.
- You can have 1 piece of **8.5" x 11"** paper.
  - ▶ With notes, examples, programs: what will help you on the exam.
  - ▶ Best if you design/write yours, it's excellent way to study.
- The exam format:
  - ▶ Same format as past exams posted on course website

# Final Overview: Format

- Closed book. No electronic devices allowed. If we see your phone we will take it until the end of the exam.
- You can have 1 piece of **8.5" x 11"** paper.
  - ▶ With notes, examples, programs: what will help you on the exam.
  - ▶ Best if you design/write yours, it's excellent way to study.
- The exam format:
  - ▶ Same format as past exams posted on course website
  - ▶ Questions based on course topics, and are variations on the programming assignments, lab exercises, and lecture design challenges.

# Final Overview: Format

- Closed book. No electronic devices allowed. If we see your phone we will take it until the end of the exam.
- You can have 1 piece of **8.5" x 11"** paper.
  - ▶ With notes, examples, programs: what will help you on the exam.
  - ▶ Best if you design/write yours, it's excellent way to study.
- The exam format:
  - ▶ Same format as past exams posted on course website
  - ▶ Questions based on course topics, and are variations on the programming assignments, lab exercises, and lecture design challenges.
  - ▶ Style of questions: short answer, fill in the program (one line of code per box), multiple choice, select all, replace value, modify program, translate & write complete programs.

# Final Overview: Format

- Closed book. No electronic devices allowed. If we see your phone we will take it until the end of the exam.
- You can have 1 piece of **8.5" x 11"** paper.
  - ▶ With notes, examples, programs: what will help you on the exam.
  - ▶ Best if you design/write yours, it's excellent way to study.
- The exam format:
  - ▶ Same format as past exams posted on course website
  - ▶ Questions based on course topics, and are variations on the programming assignments, lab exercises, and lecture design challenges.
  - ▶ Style of questions: short answer, fill in the program (one line of code per box), multiple choice, select all, replace value, modify program, translate & write complete programs.
- Past exams available on webpage (includes answer keys).

# How to Prepare

- Emphasis of this course is on analytic reasoning and problem solving.

# How to Prepare

- Emphasis of this course is on analytic reasoning and problem solving.
- The best way to prepare to do problems (reading & watching videos can clarify but not replace problem solving).

# How to Prepare

- Emphasis of this course is on analytic reasoning and problem solving.
- The best way to prepare to do problems (reading & watching videos can clarify but not replace problem solving).
- Repeat, while there are past exams:

# How to Prepare

- Emphasis of this course is on analytic reasoning and problem solving.
- The best way to prepare to do problems (reading & watching videos can clarify but not replace problem solving).
- Repeat, while there are past exams:
  - ▶ Choose a past exam (see webpage).

# How to Prepare

- Emphasis of this course is on analytic reasoning and problem solving.
- The best way to prepare to do problems (reading & watching videos can clarify but not replace problem solving).
- Repeat, while there are past exams:
  - ▶ Choose a past exam (see webpage).
  - ▶ With only a note sheet, work through in 1 hour (half the time).

# How to Prepare

- Emphasis of this course is on analytic reasoning and problem solving.
- The best way to prepare to do problems (reading & watching videos can clarify but not replace problem solving).
- Repeat, while there are past exams:
  - ▶ Choose a past exam (see webpage).
  - ▶ With only a note sheet, work through in 1 hour (half the time).
  - ▶ Grade yourself (answers on webpage).

# How to Prepare

- Emphasis of this course is on analytic reasoning and problem solving.
- The best way to prepare to do problems (reading & watching videos can clarify but not replace problem solving).
- Repeat, while there are past exams:
  - ▶ Choose a past exam (see webpage).
  - ▶ With only a note sheet, work through in 1 hour (half the time).
  - ▶ Grade yourself (answers on webpage).
  - ▶ Ask about those that don't make sense.

# How to Prepare

- Emphasis of this course is on analytic reasoning and problem solving.
- The best way to prepare to do problems (reading & watching videos can clarify but not replace problem solving).
- Repeat, while there are past exams:
  - ▶ Choose a past exam (see webpage).
  - ▶ With only a note sheet, work through in 1 hour (half the time).
  - ▶ Grade yourself (answers on webpage).
  - ▶ Ask about those that don't make sense.
  - ▶ Rewrite answers & organize by type/question number.

# How to Prepare

- Emphasis of this course is on analytic reasoning and problem solving.
- The best way to prepare to do problems (reading & watching videos can clarify but not replace problem solving).
- Repeat, while there are past exams:
  - ▶ Choose a past exam (see webpage).
  - ▶ With only a note sheet, work through in 1 hour (half the time).
  - ▶ Grade yourself (answers on webpage).
  - ▶ Ask about those that don't make sense.
  - ▶ Rewrite answers & organize by type/question number.
  - ▶ Adjust/rewrite note sheet to include what you wished you had.

# How to Prepare

- Emphasis of this course is on analytic reasoning and problem solving.
- The best way to prepare to do problems (reading & watching videos can clarify but not replace problem solving).
- Repeat, while there are past exams:
  - ▶ Choose a past exam (see webpage).
  - ▶ With only a note sheet, work through in 1 hour (half the time).
  - ▶ Grade yourself (answers on webpage).
  - ▶ Ask about those that don't make sense.
  - ▶ Rewrite answers & organize by type/question number.
  - ▶ Adjust/rewrite note sheet to include what you wished you had.
- Aim to complete 7 to 10 past exams (one a day in the week leading up to the final).

# Final Overview: Rules

You will get credit for your answers **only if:**

# Final Overview: Rules

You will get credit for your answers **only if:**

- Your answer uses language constructs that were covered in the course.

# Final Overview: Rules

You will get credit for your answers **only if:**

- Your answer uses language constructs that were covered in the course.
- Your answer is not oddly identically to that of another student or is the answer for another version of the exam.

# Final Overview: Rules

You will get credit for your answers **only if:**

- Your answer uses language constructs that were covered in the course.
- Your answer is not oddly identically to that of another student or is the answer for another version of the exam.

**All acts of academic dishonesty will be reported to the Office of Academic and Student Affairs and will result in a 0 grade on the exam.**

## Final Exam Practice Rounds:

For each question, write the function header (name & inputs) and return values (often called the Application Programming Interface (API)):

- **Write a function that takes a weight in kilograms and returns the weight in pounds.**

## Final Exam Practice Rounds:

For each question, write the function header (name & inputs) and return values (often called the Application Programming Interface (API)):

- Write a function that takes a weight in kilograms and returns the weight in pounds.

```
def kg2lbs(kg):  
    ...  
    return(lbs)
```

## Final Exam Practice Rounds:

For each question, write the function header (name & inputs) and return values (often called the Application Programming Interface (API)):

- Write a function that takes a weight in kilograms and returns the weight in pounds.

```
def kg2lbs(kg)
    lbs = kg * 2.2
    return(lbs)
```

## Final Exam Practice Rounds:

For each question, write the function header (name & inputs) and return values (often called the Application Programming Interface (API)):

- **Write a function that takes a string and returns its length.**

## Final Exam Practice Rounds:

For each question, write the function header (name & inputs) and return values (often called the Application Programming Interface (API)):

- Write a function that takes a string and returns its length.

```
def sLength(str):  
    ...  
    return(length)
```

## Final Exam Practice Rounds:

For each question, write the function header (name & inputs) and return values (often called the Application Programming Interface (API)):

- Write a function that takes a string and returns its length.

```
def sLength(str):  
    length = len(str)  
    return(length)
```

## Final Exam Practice Rounds:

For each question, write the function header (name & inputs) and return values (often called the Application Programming Interface (API)):

- Write a function that, given a DataFrame, returns the minimal value in the “Manhattan” column.

## Final Exam Practice Rounds:

For each question, write the function header (name & inputs) and return values (often called the Application Programming Interface (API)):

- Write a function that, given a DataFrame, returns the minimal value in the “Manhattan” column.

```
def getMin(df):  
    ...  
    return(min)
```

## Final Exam Practice Rounds:

For each question below, write the function header (name & inputs) and return values (often called the Application Programming Interface (API)):

- Write a function that, given a DataFrame, returns the minimal value in the “Manhattan” column.

```
def getMin(df):  
    min = df['Manhattan'].min()  
    return(min)
```

## Final Exam Practice Rounds:

For each question, write the function header (name & inputs) and return values (often called the Application Programming Interface (API)):

- **Write a function that takes a whole number and returns the corresponding binary number as a string.**

## Final Exam Practice Rounds:

For each question, write the function header (name & inputs) and return values (often called the Application Programming Interface (API)):

- Write a function that takes a whole number and returns the corresponding binary number as a string.

```
def num2bin(num):  
    ...  
    return(bin)
```

## Final Exam Practice Rounds:

For each question, write the function header (name & inputs) and return values (often called the Application Programming Interface (API)):

- Write a function that takes a whole number and returns the corresponding binary number as a string.

```
def num2bin(num):  
    binStr = ""  
    while (num > 0):  
        #Divide by 2, and add the remainder to the string  
        r = num %2  
        binString = str(r) + binStr  
        num = num / 2  
    return(binStr)
```

## Final Exam Practice Rounds:

For each question, write the function header (name & inputs) and return values (often called the Application Programming Interface (API)):

- Write a function that computes the total monthly payment when given the initial loan amount, annual interest rate, number of years of the loan.

## Final Exam Practice Rounds:

For each question, write the function header (name & inputs) and return values (often called the Application Programming Interface (API)):

- Write a function that computes the total monthly payment when given the initial loan amount, annual interest rate, number of years of the loan.

```
def computePayment(loan,rate,year):  
    ....  
    return(payment)
```

## Final Exam Practice Rounds:

For each question below, write the function header (name & inputs) and return values (often called the Application Programming Interface (API)):

- Write a function that computes the total monthly payment when given the initial loan amount, annual interest rate, number of years of the loan.

```
def computePayment(loan,rate,year):  
    (Some formula for payment)  
    return(payment)
```

# Weekly Reminders!



Before next lecture, don't forget to:

- Work and read through Lab 12!

# Weekly Reminders!



Before next lecture, don't forget to:

- Work and read through Lab 12!
- Batch 10 is due July 3rd!