# Unit 5

## Review

# Topics

- Cumulative but focused on latter material
  - Variables and Expressions
  - Conditional ('if') statements
  - Loops
  - **Strings**
  - **Arrays**
  - **Nested Loops**
  - **Functions**
  - Compiling and Debugging

# Questions 1

- Arrays are passed-by-_____
  - What does that mean?
- int, double, char, and bool variables are passed-by-_____
  - What does that mean?
- True/False: The name of an argument in a function signature must match the variable passed to the function
- Assuming x is an 'int', write an equivalent if statement to replace `if(x < 40 || x > 40)`

```
void f1(int x)
{
   ...
}

int main()
{ int x = 5;
  f1(x);
}
```

# Questions 2

- **True/False**: It is possible to have an 'else' statement without a corresponding 'if'.
- **True/False**: It is possible to have an 'else if' statement without a following 'else'.
- **True/False:** If x = 100 and y = -100 then the following 'if' statement will evaluate to true:
  - if ( x != 100 || y > 0 || y != 100) { }
- Character array strings (written in double quotes ("..")) end with what special character?
- **True/False**: There is no difference between 'a' and "a".

# Questions 3

- **True/False:** You can append a character to a character array using the '+' operator
  - For example: char str[10] = "Hi"; str = str + "t"; would yield "Hit"
  - How could you make the char array have the word "hit"
- **True/False**: C++ `strings` track their size.
- What will the code to the right print?

```
int f1(int x)
{
  x = x-1;
  return x;
}

int main()
{ int x = 5;
  f1(x);
  cout << x;
}
```

# Trace the Program Output

```
// Assume the user types in:
//
// 4
// 3 17 8 1
//
// What will be output?
int main() {
   // read the input
   int n;
   cin >> n;
   int data[100]; // declare an array, max size 100
   for (int i = 0; i < n; i++)
      cin >> data[i]; // read elements of data from input


   for(int i=0; i < n; i++){
      int temp = data[i];
      data[i] = data[n-i-1];
      data[n-i-1] = temp;
   }

   for (int i = 0; i < n; i++)
      cout << data[i] << " ";

   return 0;
}
```

# Trace the Program Output

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

void f1(int d[], int n, int x);
int f2(int d[], int a, int b);
int f3(int a, int b, int c);

void f1(int d[], int n, int x)
{
  for(int i=0; i <= n/x; i++){
    d[i] = x*x;
  }
}

int f2(int d[], int a, int b)
{
  int sum = 0;
  for(int i=a; i < b; i++){
    if( d[i] % 2 == 0 ){
      sum += d[i];
    }
  }
  return sum;
}
```

```
int f3(int a, int b, int c)
{
  if( a % b == 0) {
    b += 2;
    return c;
  }
  else if( a % c == 0) {
    c -= 1;
    return b;
  }
  return a;
}

int main()
{
  int dat[8] = { 2, 5, 6, 8, 2, 4, 2, 12};
  f1(dat, 8, f3(dat[7], dat[1], 3));
  cout << f2(dat, 1, 6) << endl;
  for(int i=0; i < 8; i++){
    cout << dat[i] << " ";
  }
  cout << endl;
  return 0;
}
```

# Exercises

- Final-prac-1

# Debugging

- Debug 'primes'

# Trace the Program Output (Sol)

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

void f1(int d[], int n, int x);
int f2(int d[], int a, int b);
int f3(int a, int b, int c);

void f1(int d[], int n, int x)
{
  for(int i=0; i <= n/x; i++){
    d[i] = x*x;
  }
}

int f2(int d[], int a, int b)
{
  int sum = 0;
  for(int i=a; i < b; i++){
    if( d[i] % 2 == 0 ){
      sum += d[i];
    }
  }
  return sum;
}
```

```
int f3(int a, int b, int c)
{
  if( a % b == 0) {
    b += 2;
    return c;
  }
  else if( a % c == 0) {
    c -= 1;
    return b;
  }
  return a;
}

int main()
{
  int dat[8] = { 2, 5, 6, 8, 2, 4, 2, 12};
  f1(dat, 8, f3(dat[7], dat[1], 3));
  cout << f2(dat, 1, 6) << endl;
  for(int i=0; i < 8; i++){
    cout << dat[i] << " ";
  }
  cout << endl;
  return 0;
}
```

f3(…) returns 5

f1(…) updates d[0] = 25, d[1] = 25

f2(…) returns 20

25 25 6 8 2 4 2 12