

Computer Science 2530
Spring 2020
Exam 1
Solutions

1. What is the value of C++ expression $9-5-2*3$? **Answer:** $9-5-2*3 = (9-5) - (2*3) = 4-6 = -2$.
2. What is the value of C++ expression $19/5 + 3/5$? **Answer:** $= 3 + 0 = 3$. ($19/5$ has quotient 3 and remainder 4. $3/5$ has quotient 0 and remainder 3.)
3. What is the value of C++ expression $(14 \% 3 + 1)$? **Answer:** $(14 \% 3 + 1) = 2 + 1 = 3$. (The remainder when you divide 14 by 3 is 2.)
4. What is the type of expression $2.0*3.0 + 1$? **Answer:** double.
5. When you create a variable x using statement

```
int x;
```

x will have an initial value, but you have no way of knowing what that value will be when the program runs.

6. [MC] What is the value of b after statement

```
bool b = 3 > 2 && 4 == 4;
```

is performed? **Answer:** $3 > 2$ is true. $4 == 4$ is true. Since they are both true, their 'and' is true. So b has value true.

7. What is the value of variable x after the following statements?

```
int y = 10;  
int x = y;  
y = 50;  
x++;  
y++;
```

Answer: $x = 11$. (x is set to 10 at the second line and incremented at the fourth line.)

8. Function $f(n)$ is defined below in C++. What is the value of C++ expression $f(f(3))$?

```
int f(const int n)  
{  
    int m = (n+1)*(n+1);  
    return m + 1;  
}
```

Answer:

$$f(3) = 4 \cdot 4 + 1 = 16 + 1 = 17.$$

$$f(f(3)) = f(17) = 18 \cdot 18 + 1 = 324 + 1 = 325.$$

9. The distance between numbers x and y on a number line is $|x - y|$. Write a C++ definition of function `distance(x, y)`, which returns the distance between numbers x and y on a number line. You can use function `abs` from the library. Do not use `sqrt`. A heading is given.

```
int distance(int x, int y)
{
    return abs(x - y);
}
```

10. Imagine that you start at one number w on a number line and walk to another number x . Then, from there, you walk to another number y , and then to another number z . Write a C++ definition of function `totalDistance(w, x, y, z)`, which returns the total distance traveled walking from w to x to y to z . You *must* use your function from the preceding problem to determine the distance between two numbers. Do not use any library functions in this function definition. A heading is given.

```
int totalDistance(int w, int x, int y, int z)
{
    return distance(w, x) + distance(x, y) + distance(y, z);
}
```

11. Write a C++ definition of function `ascending(x, y, z)`, which returns true if sequence (x, y, z) is in strictly ascending order, and returns false if not. A heading is given.

```
bool ascending(int x, int y, int z)
{
    return x < y && y < z;
}
```