

**Question 1. (20 pts)**

Each of the following sections of code doesn't work properly.

In each case, **identify the error (compiler, run-time, or logical) AND correct the following code so it will do what is explained:**

- a. The following section of code is supposed to initialize two numbers x and y and compute their sum.

```
int x = 5;
int y = "10";

int sum = x + y;

System.out.println("Sum: " + sum);
```

- b. The following section of code is supposed to calculate the sum of the numbers 1 to n.

```
Scanner stdin = new Scanner(System.in);
int n = stdin.nextInt();
int sum;
for (int i = 1; i <= n; i++) {
    sum = 0;
    sum = sum + i;
}

System.out.println("sum = " + sum);
```

- c. The following section of code is supposed to initialize a number and uses a loop to print the result of that number divided by the denominator (starting at 5 and decreasing, i.e. 10/5, 10/4, etc.)

```
int num = 10;
int denominator = 5;

while (denominator >= 0) {
    int result = num / denominator;
    System.out.println("Result of division: " + result);
    denominator--;
}
```

- d. The following section of code is supposed to print each of the numbers from 1 to n, each on a new line. (Assume that n has been assigned a value.)

```
for (int i = 1; i <= n; i++)
    System.out.println(n);
```

**Question 2. (20 pts)**

Write a Java expression that would compute each of the following equations:

a.

$$x = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$$

b.

$$y = \frac{9x^3 - 27x^2 - 4x + 12}{(3x^2 + 1)^{1/2} + |5 - x^4|}$$

**Question 3. (15 pts)**

What will be the values of x, y and z after the execution of following program segment:

```
int a = 5, b = 5, c = 4, d = 4, e = 2, f = 1;
int x, y, z;

if ((a > b && c > d) || e > f) {
    x = 15;
} else {
    x = 20;
}

if (a > b && (c > d || e > f)) {
    y = 15;
} else {
    y = 20;
}

if (a > b && c > d || e > f) {
    z = 15;
} else {
    z = 20;
}
```

**Question 4. (20 pts)**

The file **numbers.txt** contains four numbers on two lines -- one pair per line.

Write a complete Java program to read the numbers in as integers and print the sum of each pair — one sum per line.

For example:

If the file **numbers.txt** contains:

**1 2**

**3 4**

the output of the program should be:

**The sum of 1 and 2 is 3**

**The sum of 3 and 4 is 7**

### Question 5. (25 pts)

Write a complete Java program (starting from import statement(s)) that reads in (from the keyboard) the following information about an employee:

- ID Number
- Last name
- First name
- Years worked (a whole number)
- Annual salary

An employee's vacation time is based on the following table:

Years worked	Weeks of vacation
0 - 3	1
4 - 6	2
7 or more	3

Bonuses are determined by the following table:

Years worked	Bonus
0 - 4	None
5 - 9	\$200.00
10 or more	5% of annual salary

Your program should **read in the information for an employee, calculate the vacation time and bonus amount for the employee, and display the employee's ID number, name (in order: first name THEN last name), number of years worked, annual salary (with 2 decimal places), number of weeks of vacation and amount of bonus (also with 2 decimal places) on three lines as shown below.**

Sample output: (when ID is 12345, name is "John Doe", years worked is 5 and salary is 10000)

**Employee ID #12345:**

**John Doe has worked for 5 years at an annual salary of \$10000.00**

**So they get a 2 week vacation, and a bonus of \$200.00**

**Keep reading in employees (use a loop) until the user enters an ID number of -1.**

**Answer Question 5 Below:**