SOLUTIONS

COMP 131 Practice Midterm Exam I
100 points

name: _____

1. (4 points) Give the base 10 value of the following binary number: 10110

$0\times2^0 + 1\times2^1 + 1\times2^2 + 0\times2^3 + 1\times2^4$

$= 0 + 2 + 4 + 0 + 16 = 22$

2. (4 points) Give the binary representation for the following base 10 number: 19

$19 = 16 + 2 + 1$

$= 1\times2^4 + 0\times2^3 + 0\times2^2 + 1\times2^1 + 1\times2^0$ 10011

3. (5 points) What was the major contribution of the stored-program architecture?

Both data and program instructions are stored in memory

4. (4 points) What role does the program counter play in the execution of a program?

It keeps track of the memory location which holds the next instruction to be executed

5. (10 points) Indicate whether each of the following is a class or an object by writing **class** or **object** in the blank.

Football Team	class
Dickinson College	object
Movie Actor	class
Dallas Cowboys	object
Robert Redford	object

6. Consider the following definition of the Exam class:

```
public class Exam {
    private int totalPoints;
    private double finalScore;

    public Exam() {
        totalPoints = 100;
        finalScore = 0;
    }

    public void setScore(double score) {
        finalScore = score;
    }

    public double getPercent() {
        double pct = finalScore * 100 / totalPoints;
        return pct;
    }
}
```

(a) (10 points) Fill in the blank next to each part of the above program with the letter corresponding to the term that best describes that part of the program.

`totalPoints`	f.	a. method
`Exam`	g	b. assignment statement
`getPercent`	a	c. return statement
`pct`	e	d. data type
`score`	h	e. local variable
`finalScore = score;`	b	f. field
`int`	d	g. constructor
`return pct;`	c	h. formal parameter

(b) (5 points) Is it possible to completely test the correctness of the constructor for this class without adding additional methods to the class? Why or why not?

No - we need accessor methods to verify that the fields have been set to the right values

7. (3 points) Assume that x is a variable of type `int`. List or describe all values of x that will make the following boolean expression false: `(x <= 2) || (x != 5)`

5

8. (3 points) Assume that x is a variable of type `int`. List or describe all values of x that will make the following boolean expression true: `!(x < 2) && (x < 7)`

2, 3, 4, 5, 6

9. Consider the following field definitions for a class representing a baseball team.

```
public class BaseballTeam {
    private String teamName;
    private int numPlayers;
    private int wins;
    private int losses;
```

(a) (5 points) Fill in the body of constructor for the `BaseBallTeam` class given below. This constructor should initialize the team name and number of players using the values provided by the formal parameters. In addition the team should have no wins and no losses.

```
public BaseBallTeam(String name, int players) {
```

teamName = name;
numPlayers = players;
wins = 0;
losses = 0;

```
}
```

(b) (5 points) Write an accessor method for the `wins` field.

public int getWins () {
    return wins;
}

(c) (5 points) Complete the `addPlayers` method shown below so that the number of players on the team is increased by the specified number of new players.

```
public void addPlayers(int numNewPlayers) {
```

numPlayers = numPlayers + numNewPlayers;

```
}
```

10. (12 points) Consider adding the following three methods to the Car class. (For reference, the fields of the class are also included below.) Each of these methods contains at least one error that would prevent the class from compiling. Find one such error in each method, and explain why it is an error. Write your answer for each method next to that method.

```
public class Car
{
    private String make; // the manufacturer of the Car
    private String model; // i.e. Focus, Silverado, ...
    private String color;
    private int year;

    /** make the car newer by newerBy years */
    public void makeNewer(String newerBy)
    {
        year = year + newerBy;
    }

    /** print the amount that the car is newer by */
    public void printNewer()
    {
        System.out.println("The " + make + " " + model +
            " is newer by " + newerBy + " years.");
    }

    /** find the age of the Car in 2005 */
    public void getAge()
    {
        int age;
        age = 2005 - year;
        return age;
    }
}
```

should be int

the scope of the formal parameter "newerBy" is limited to the body of the makeNewer method

should be int — the method returns an integer

11. (4 points) In Java, what is the value of the following expression?: 78 / 50

1 ($\frac{78}{50}$ = 1 remainder 28; Java ignores the remainder)

12. (4 points) In Java, what is the value of the following expression?: 75 % 30

15 ($\frac{75}{30}$ = 2 remainder 15)

13. (5 points) Assume that x and y are variables of type `int`. Can the following snippet of code ever print `not a root vegetable` to the terminal window? Why or why not?

```
if (x == y) {
    System.out.println("carrot");
} else if (x < y) {
    System.out.println("potato");
} else if (x > y) {
    System.out.println("rutabaga");
} else {
    System.out.println("not a root vegetable");
}
```

No — for any ~~two~~ integers x and y, either $x = y$ or $x > y$ or $x < y$, so any possibility will be caught by one of the "if" statements

14. Consider an experiment that collects safety data from crash testing cars. Each trial of the experiment reports the likelihood of serious injury due to a crash. In 50 experiments with one type of car (call it type A), the average likelihood of injury was 35% with a standard deviation of 5%. For 50 experiments with another type of car (call it type B), the average likelihood of injury was 41% with a standard deviation of 4%.

    (a) (5 points) Is it possible that a specific car of type B is actually safer than a specific car of type A? Justify your answer.

Yes - although the majority of type B had a likelihood of injury between 37% (41% − 1 SD) and 45% (41% + 1 SD), some may fall outside this range.

    (b) (7 points) Suppose our hypothesis is that car type A is safer (has a lower likelyhood of injury) than car type B. What is the largest that the average likelihood of injury could be for car type A so that this hypothesis is strongly supported? Assume that the average likelihood of injury for car type B does not change and that standard deviations for both car types do not change. Justify your answer.

32%

If the mean were greater than 32%, then the mean + 1 SD for type A would be greater than the mean − 1 SD for type B (41 − 4 = 37).