Practice Final

<https://csci-1301.github.io/about#authors>

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The final exam will be a closed-book paper exam without a calculator. Exam questions will be similar in type to those found here, but fewer in number. While this practice exam is a good study guide, we highly recommend being familiar with *all the material* (including but not limited to your previous exams, labs, projects, quizzes and homework) as well.

# Problem 0 (Warm-up)

1. What is the escape sequence for a new line?
2. What is the return type of a constructor?
3. List 4 datatypes.
4. What is the difference between a variable and a constant?
5. In an exam class, if I want to keep track of the total number of exams should the attribute be static or non-static?
6. Write a condition that evaluates to true if an int length is between 4 and 16, both inclusive.
7. Write a statement or statements that creates an int array of size 50 with each index containing that index as its value. (i.e. 0 at [0], 13 at [13], 49 at [49], etc.).
8. Write a statement or statements to create a random number generator called examRand and use it to generate a random number between 40 and 57 (inclusive).

# Problem 1

Consider the code below:

class VirtualPet{  
 private string name = "Blank"; // Name of the pet.  
 private decimal hungerLevel = 1m; // Level of hunger, with 1 being full, in percent.  
 private decimal happinessLevel = 1m; // Level of happiness, in percent  
  
 public void SetName(string nameP)  
 {  
 name = nameP;  
 }  
}

1. Write a statement to instantiate a VirtualPet object called firstPet.
2. Write a getter for the name attribute.
3. Write a setter for the hungerLevel attribute that takes one decimal. The argument should be assigned to the hungerLevel attribute only if it is between 0 and 1 (both included), otherwise the attribute should get the value 0.
4. Draw the UML diagram for the VirtualPet class, including the methods you just added.
5. Write a constructor that takes 3 arguments (string, decimal, decimal) for the VirtualPet class. Your constructor should be such that if one of the decimal arguments is not between 0 and 1 (both included), then 0 gets assigned to both decimal attributes.
6. Your earlier statement that created the firstPet object will no longer compile after you add the constructor. Why is this the case?
7. Write a ToString method for the VirtualPet class. It should display the name, hungerLevel, and happinessLevel. (Bonus) Display hungerLevel and happinessLevel graphically: for instance, if hungerLevel is at 4.5, display “Hunger: XXXX”. You may freely use symbols as if they were normal letters.
8. Write a statement that would use the ToString method from the VirtualPet class you just added to display information about the secondPet object.

# Problem 2

This question will have you partially design, implement and use class to represent hamburgers. A Burger has a name, a price, a Boolean for dairy, and a type (typically beef, pork, chicken, veggie).

1. Draw the UML diagram for the Burger class, assuming it contains the listed attributes, a getter for the name attribute and a setter for the price attribute. Do not include any other methods.
2. Write a setter for the price attribute.
3. Write an additional constructor that takes a name, a dairy, and a type. The price should then be set according to the following table. If the value for type is not in the table, price should be set to -99.99.
4. Write a static method Promotion that takes as an argument a price and returns a value 75% of the argument.
5. Write a ToString method. The string returned should contain the values of all attributes.

# Problem 3

Complete the table based on the code.

| x | y | z | Displays |
| --- | --- | --- | --- |
| -1 | ‘e’ | 18.2M |  |
| -1 | ‘a’ | -2 |  |
| 0 | ‘c’ | 4.6M |  |
| 1 | ‘d’ | 2 |  |
| -1 | ‘b’ | 115 |  |
| 1 | ‘d’ | -33.7M |  |
| 0 | ‘a’ | 0 |  |
| 1 | ‘c’ | 13 |  |
|  |  |  | 5 |

int x;  
char y;  
decimal z;  
  
// x, y, and z are given legal values  
  
if(x<0 && y == 'a'){  
 Console.Write("1");  
}  
else if(z%2==0){  
 Console.Write("2");  
}  
else if(y=='c' || y=='d'){  
 Console.Write("3");  
}  
else if(x!=0 && z!=0){  
 Console.Write("4");  
}  
else{  
 Console.Write("5");  
}

# Problem 4

Given two int arrays of equal length, write a code segment that compares the values at each index to see if they match. Return the total number of matches.

# Problem 5 (Deceptively hard)

Given two string arrays (array A and array B) of unknown (possibly different) lengths, determine if there are any values found in both A and B. If they exist, display them to the screen. At the end of the program, display the total number of common values between A and B. If there are repeating values in either or both arrays, each should only be counted once.

(Bonus): How could Lists be used to make this problem easier?

# Problem 6

Write a program that declares an int variable called “pin” and asks the user for their pin. As long as the user enters something that is not a number, is negative, or greater than 9999, your program should ask again.

(Bonus): Your code should make sure that the pin has exactly 4 digits, including leading zeros.

# Problem 7

1. Write a statement that would create an int array of size 100.
2. Write a series of statements that would ask the user to enter a value for each cell in the array (no need to perform user-input validation, but you may if you like).
3. Write a series of statements that would ask the user to enter a value, displaying “In your array” if the value is in your array.
4. Write a series of statements that would display the sum of values in the array.
5. Write a series of statements that would display the product of all the non-zero values in the array.
6. Write a series of statements that would display the smallest index of the greatest value in the array.