Midterm practice questions
Introduction to Computer Science CSCI-UA.0101-00[4,5]
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** Note that these are practice problems, not a practice exam. In other words, the exam may include other things, be shorter, etc. Moreover, it does not necessarily cover everything that could appear on the exam.

Programming questions

a. Write a Java method named `isVowel` that returns whether a char is a vowel. The vowel letters are as follows, a, e, i, o, u and sometimes y. (You should decide 'y' is vowel half the time.)

   `isVowel('a') → true`
   `isVowel('b') → false`
   `isVowel('y') → true about %50 of the time, false about %50 of the time.`

   Note:
   You do not have to write a `main()` method
   Hint: What's the probability that any given integer is even?
b. You are driving too fast and a police officer stops you. Write a Java method called `caughtSpeeding` to compute the fine you receive, encoded as an int value: 0=no ticket, 100=small ticket, 200=big ticket. If speed is 60 or less, the result is no ticket. If speed is between 61 and 80 inclusive, the result is small ticket. If speed is 81 or more, the result is a big ticket. Unless it is your birthday -- on that day, your speed can be 5 higher in all cases.

```java
caughtSpeeding(61, false) \to 100
caughtSpeeding(81, true) \to 100
caughtSpeeding(61, true) \to 0
```

Note:
You do not have to write a main() method
c. Write a Java method that takes two integer arrays and returns an array that has all the elements from both argument arrays.

```java
int[] a = {1,2,3};
int[] b = {4,5,6};
append(a, b) → {1,2,3,4,5,6}

int[] a = {1};
int[] b = {};
append(a, b) → {1}
```

Note:
Your method should work on arrays of arbitrary length
You do not have to write a main() method
d. Convert the following if statement into a switch

```java
String message = "";
char grade = getGradeFromGrader();
if (grade == 'A') {
    message = "Great work!";
} else if (grade == 'B') {
    message = "Nicely done!";
} else if (grade == 'C') {
    message = "Consider tutoring";
} else {
    message = "Failing";
}
```

Note:
Your do not need to write a method
Ignore how getGradeFromGrader() might be implemented.
Short Answers

a. Given the following variable definitions:

```java
int x = 12;
int y = 6;
int z = 28;
```

Write the result of these boolean expressions:

- \( y \times 2 + 3 > z \) = _______
- \(! (x \mod 2 < 1)\) = _______
- \(x < y || x < z\) = _______
- \(z / x < x / y \times x\) = _______
- \(x > y && y < z || x > z\) = _______

c. What is the output of the following program?

```java
public class SomeClass {
    public static void main(String[] args) {
        char[] a = {'a', 'b', 'c', 'd', 'e'};
        System.out.println("a.length="+a.length);
        for(int i = 0; i < a.length; i++) {
            if(i % 2 == 0)
                System.out.println(a[i]);
        }
    }
}
```

d. Explain briefly the purpose of the break and continue keywords.

e. Explain briefly the purpose of unicode.

f. Write the primitive data type that would be the best choice for representing each of the following kinds of information.

- The length of a baseball bat: ________________
- The number of people in a class: ________________
- The number of days in a month: ________________
- The average daily temperature in degrees Celsius: ________________
- The ratio of a rectangle's width to its height: ________________
- The number of grains of sand on a beach: ________________
- The best possible letter grade on this exam: ________________
True/False

a. T | F The arguments to a method call must always match the formal parameters in compatible type, order, and number.

b. T | F The break statement causes all loops in the current program to exit.

c. T | F Scope of a variable declared inside the for loop ends when the loop ends.

d. T | F Once the array is created (i.e. memory is allocated) its size can be changed by calling the extend() method.

e. T | F The expression 6 * (int) Math.random() can be used to generate random integers in the range from 0 to 5 exclusive.

f. T | F You can explicitly convert a value from one type to another using the (type) value notation.

g. T | F You can safely convert a value of a double to a value of a float without casting because they both are floating point types.

h. T | F It is possible for the bodies (statements inside the loop) of for loops and while loops to execute zero times.