Assignment 3

Q1.Ask the user for two words and two numbers, and let the person at the keyboard type in some values, but don't bother storing their responses into any variables.

Again, there is no need to create any variables, except for the Scanner variable typically named keyboard.

Q2.Ask the user for their name. Then display their name to prove that you can recall it. Ask them for their age. Then display that. Finally, ask them for how much they make and display that. You should use the most appropriate data type for each variable.

Q3.Ask the user for several pieces of information, and display them on the screen afterward as a summary.

* first name
* last name
* grade (classification)
* student id number
* login name
* GPA (0.0 to 4.0)

You must use the most appropriate type for each variable and not just Strings for everything.

Q4.Ask the user for their name. Then display their name to prove that you can recall it. Ask them for their age. Then display what their age would be five years from now. Then display what their age would be five years ago.

Q5.Make a simple numeric calculator. It should prompt the user for three numbers. Then add the numbers together and divide by 2. Display the result. Your program must support numbers with decimals and not just integers.

Q6.The body mass index (BMI) is commonly used by health and nutrition professionals to estimate human body fat in populations.

It is computed by taking the individual's weight (mass) in kilograms and dividing it by the square of their height in meters.

Q7.Write an interactive quiz. It should ask the user three multiple-choice or true/false questions about something. It must keep track of how many they get wrong, and print out a "score" at the end.

Are you ready for a quiz? N

Okay, here it comes!

Q1) What is the capital of Alaska?

1) Melbourne

2) Anchorage

3) Juneau

> 3

That's right!

Q2) Can you store the value "cat" in a variable of type int?

1) yes

2) no

> 1

Sorry, "cat" is a string. ints can only store numbers.

Q3) What is the result of 9+6/3?

1) 5

2) 11

3) 15/3

> 2

That's correct!

Overall, you got 2 out of 3 correct.

Thanks for playing!

Q8.The body mass index (BMI) is commonly used by health and nutrition professionals to estimate human body fat in populations. It is computed by taking the individual's weight (mass) in kilograms and dividing it by the square of their height in meters.

Start with the [BMI Calculator](https://programmingbydoing.com/a/bmi-calculator.html) you wrote previously (BMICalc.java). Then use some if statements to show the category for a given BMI.

|  |  |
| --- | --- |
| BMI | category |
| less than 18.5 | underweight |
| 18.5 to 24.9 | normal weight |
| 25.0 to 29.9 | overweight |
| 30.0 or more | obese |

Q9.Write a program that compares several **String**s using the compareTo**()** method. You should display the **String**s and display the integer that compareTo**()** gives you.

You must have five examples which result in a number less than 0, five examples which result in a number greater than 0, and two examples which give you exactly 0. This means you need a total of twelve examples.

You may not just flip the **String**s around; you must have twelve different examples.

Here's an example:

**System**.out.print**("Comparing \"axe\" with \"dog\" produces ")**;

**int** i = **"axe"**.compareTo**("dog")**;

**System**.out.println**(**i**)**;

**System**.out.print**("Comparing \"applebee's\" with \"apple\" produces ")**;

**System**.out.println**(** **"applebee's"**.compareTo**("apple")** **)**;

Comparing "axe" with "dog" produces -3

Comparing "applebee's" with "apple" produces 5

Q10.Make a program that asks for the last name of the user. Depending on their last name, make a statement about how long they have to wait during roll call. You need to use else ifs to make sure only one statement gets printed.

Once you understand how compareTo() works, this is a pretty straightforward assignment, much like [How Old Are You, specifically](https://programmingbydoing.com/a/how-old-are-you-elseif.html), except that it uses Strings instead of ints and so you must use the compareTo**()** method.

* name is "Carswell" or before: say "you don't have to wait long"
* name is "Jones" or before: say "that's not bad"
* name is "Smith" or before: say "looks like a bit of a wait"
* name is "Young" or before: say "it's gonna be a while"
* name is after "Young": say "not going anywhere for a while?"

What's your last name? Stephanopolis

It's going to be a while before we get to you, "Stephanopolis".

**Note: Random Numbers:**

**o pick a random number, you first need to import java.util.Random;.**

**Then, you must create a random-number generator object, like so:**

**Random r = new Random();**

**Once that's finished, you can have the computer pick a random integer like this:**

**int x = 1 + r.nextInt(10);**

**That'll pick a random number from 1 to 10 (inclusive) and store it into the variable x.**

Q11.Make a number-guessing game to actually pick a random number from 1 to 10 and have the user try to guess that. Tell them if they get it right or wrong, and if they get it wrong, show them what the random number was.

They will still only get one try.

I'm thinking of a number from 1 to 10.

Your guess: 3

Sorry, but I was really thinking of 4.

I'm thinking of a number from 1 to 10.

Your guess: 4

Sorry, but I was really thinking of 7.

I'm thinking of a number from 1 to 10.

Your guess: 2

That's right! My secret number was 2!

Q12.Write a program that simulates a random fortune from a fortune cookie. You must have at least six fortunes.

Fortune cookie says: "You will find happiness with a new love."

Q13.Write a program that simulates a dice roll by picking a random number from 1-6 and then picking a second random number from 1-6. Add the two values together, and display the total.

HERE COMES THE DICE!

Roll #1: 3

Roll #2: 5

The total is 8!

Q 14. Modify your previous [number-guessing game](https://programmingbydoing.com/a/a-number-guessing-game.html) so that they can guess until they get it right. That means it will keep looping as long as the guess is different from the secret number. Use a while loop.

I have chosen a number between 1 and 10. Try to guess it.

Your guess: 5

That is incorrect. Guess again.

Your guess: 4

That is incorrect. Guess again.

Your guess: 8

That is incorrect. Guess again.

Your guess: 6

That's right! You're a good guesser.

Q15. Modify your dice game from last time so that it keeps rolling until they get doubles (the same number on both dice).

Notice that since there's no user input, this will happen very quickly (all the rolls will happen one right after the other).

Q16. Write a program that picks a random number from 1-100. The user keeps guessing as long as their guess is wrong, and they've guessed less than 7 times. If their guess is higher than the number, say "Too high." If their guess is lower than the number, say "Too low." When they get it right, the game stops. Or, if they hit seven guesses, the game stops even if they never got it right.

This means your while loop will have a compound condition using &&.

Q17.Write a program that starts with three "piles" of 3 counters each. Let the player choose piles and remove counters until all the piles are empty.

1. Start by placing counters (coins or toothpicks or something) into 3 piles.
2. The player picks a pile, then removes one or more counters from that pile. (It's okay to take the whole pile.)
3. The player picks a new pile, then removes one or more counters from that pile. (It's okay to pick the same pile as before.)
4. Once all piles are empty, the game stops.

You do not need to check for errors like a wrong pile name, or if someone tries to take more counters from the pile than the pile has.

## Sample Output

Here is an example game, with starting piles of 3 counters.

A: 3 B: 3 C: 3

Choose a pile: A

How many to remove from pile A: 2

A: 1 B: 3 C: 3

Choose a pile: C

How many to remove from pile C: 3

A: 1 B: 3 C: 0

Choose a pile: B

How many to remove from pile B: 1

A: 1 B: 2 C: 0

Choose a pile: A

How many to remove from pile A: 1

A: 0 B: 2 C: 0

Choose a pile: B

How many to remove from pile B: 1

A: 0 B: 1 C: 0

Choose a pile: C

How many to remove from pile C: 2

A: 0 B: 1 C: -2

Choose a pile: B

How many to remove from pile B: 1

A: 0 B: 0 C: -2

All piles are empty. Good job!

Q18.Nim is a strategy game between two players.

1. Start by placing counters (coins or toothpicks or something) into 3 piles.
2. Player #1 picks a pile, then removes one or more counters from that pile. (It's okay to take the whole pile.)
3. Player #2 picks a pile, then removes one or more counters from that pile.
4. Player #1 plays again. (It's okay to choose a different pile this time.)
5. Whichever player is forced to take the last counter is the LOSER.

Write a program that allows two human players to play Nim against each other. The program should detect when the last counter has been taken and declare a winner.

At first, don't worry about detecting cheating. That is one of the bonus options.

## Sample Output

Here is an example game, with starting piles of 3, 4, and 5 counters.

Player 1, enter your name: Alice

Player 2, enter your name: Bob

A: 3 B: 4 C: 5

Alice, choose a pile: A

How many to remove from pile A: 2

A: 1 B: 4 C: 5

Bob, choose a pile: C

How many to remove from pile C: 3

A: 1 B: 4 C: 2

Alice, choose a pile: B

How many to remove from pile B: 1

A: 1 B: 3 C: 2

Bob, choose a pile: B

How many to remove from pile B: 1

A: 1 B: 2 C: 2

Alice, choose a pile: A

How many to remove from pile A: 1

A: 0 B: 2 C: 2

Bob, choose a pile: B

How many to remove from pile B: 1

A: 0 B: 1 C: 2

Alice, choose a pile: C

How many to remove from pile C: 2

A: 0 B: 1 C: 0

Bob, choose a pile: B

How many to remove from pile B: 1

A: 0 B: 0 C: 0

Alice, there are no counters left, so you WIN!

## Bonus #1 - Cheat Protection

Prevent the users from doing anything bad:

...a game already in progress.

A: 0 B: 1 C: 0

Bob, choose a pile: A

Nice try, Bob. That pile is empty. Choose again: B

How many to remove from pile B: 0

You must choose at least 1. How many? 1

A: 0 B: 0 C: 0

And what about this?

A: 1 B: 4 C: 5

Bob, choose a pile: C

How many to remove from pile C: 8

Pile C doesn't have that many. Try again: 3

A: 1 B: 4 C: 2

And don't forget this:

A: 1 B: 4 C: 5

Bob, choose a pile: C

How many to remove from pile C: -2

You must choose at least 1. How many? 3

A: 1 B: 4 C: 2

## Bonus #2 - Dignity

Make your program detect when there is only one counter left and declare the winner one turn earlier.

...a game already in progress.

A: 0 B: 2 C: 2

Bob, choose a pile: B

How many to remove from pile B: 1

A: 0 B: 1 C: 2

Alice, choose a pile: C

How many to remove from pile C: 2

A: 0 B: 1 C: 0

Bob, you must take the last remaining counter, so

you lose. Alice wins!

## Bonus #3 - Fancy Display (Rows)

Visually display the counters in rows instead of just showing a number. You must use loops for this.

A: \*\*\*

B: \*\*\*\*

C: \*\*\*\*\*

Alice, choose a pile: A

How many to remove from pile A: 2

A: \*

B: \*\*\*\*

C: \*\*\*\*\*

Bob, choose a pile: C

How many to remove from pile C: 3

A: \*

B: \*\*\*\*

C: \*\*

## Bonus #4 - Fancy Display (Columns)

Visually display the counters in columns. You must use a loop for this.

This is quite difficult.

\*

\* \*

\* \* \*

\* \* \*

\* \* \*

A B C

Alice, choose a pile: A

How many to remove from pile A: 2

\*

\* \*

\* \*

\* \*

\* \* \*

A B C

Bob, choose a pile: C

How many to remove from pile C: 3

\*

\*

\* \*

\* \* \*

A B C

## Bonus #5 - Computer Opponent

Allow one human player to play against a computer opponent. The computer must attempt to win and not break any rules.

It is possible to make a computer player that ALWAYS wins if it goes first. The [Wikipedia article for Nim](http://en.wikipedia.org/wiki/Nim) explains the theory.

Q20.Write a program that uses a for loop. With the loop, make the variable x go from -10 to 10, counting by 0.5. (This means that x can't be an int.).

Q21.Write a program that prints the numbers from 1 to 100. But for multiples of three print "Fizz" instead of the number and for the multiples of five print "Buzz". For numbers which are multiples of both three and five print "FizzBuzz".

Q22.Baby Blackjack

Write a program that allows a human user to play a single hand of "blackjack" against a dealer.

1. Pick two values from 1-10 for the player. These are the player's "cards".
2. Pick two more values from 1-10 for the dealer.
3. Whoever has the highest total is the winner.
4. There is no betting, no busting, and no hitting. Save that for real blackjack.

Baby Blackjack!

You drew 6 and 5.

Your total is 11.

The dealer has 7 and 3.

Dealer's total is 10.

YOU WIN!

Q23.