

COMP1022Q
Introduction to Computing with Excel VBA

Making Random Numbers

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Outcomes

- After completing this presentation, you are expected to be able to:
 1. Use VBA to generate random numbers in a particular range
 2. Use VBA to change the sequence of random numbers so it is not always the same

Random Numbers in VBA

- Random numbers can be generated in VBA using the `Rnd` function
- The `Rnd` function generates a real number smaller than 1 and bigger than or equal to 0, i.e. $[0, 1)$
- For example, the following line of code puts a random number in a variable `MyNumber`

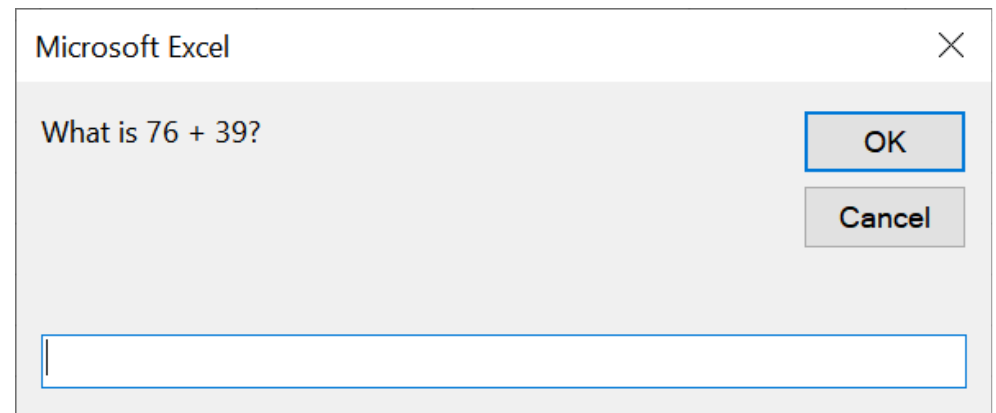
```
MyNumber = Rnd()
```

These brackets are optional for `Rnd`

– you can ignore them, if you want to

An Example of Making Random Numbers

- Let's make some code which creates a simple math addition game using random numbers
- In the code, two random integers in the range 1 to 100 are generated
- The user is then asked what the sum of those two numbers is, like this:



Generating Random Integers 1/2

- To make the code, we need two random numbers
- To generate one random integer in the range of 1 to 100 you do these steps:

1. Generate a number between 0 to 0.99999 using the Rnd function

```
RandomNumber = Rnd()
```

2. Multiply the generated number by 100

```
RandomNumber = Rnd() * 100
```

RandomNumber
is in [0, 1)



RandomNumber
is in [0, 100)



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Generating Random Integers 2/2

3. Dump the decimal place using the `Int` function (it doesn't do any rounding)

```
RandomNumber = Int(Rnd() * 100)
```

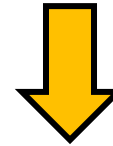
4. Add 1 to the number

```
RandomNumber = Int(Rnd() * 100) + 1
```

*Continued from the
previous slide...*



RandomNumber
is in [0, 99]



RandomNumber
is in [1, 100]

Storing Things

- For the following game we will use variables that store text
- And we will also use variables that store integer numbers
- For example:

```
Dim MyFavouriteText As String 'stores text
```

```
Dim MyFavouriteNumber As Integer 'stores an integer
```

- Here's some examples of using the variables:

```
MyFavouriteText = "you are a silly sausage"
```

```
MyFavouriteNumber = 8888
```

Math Game 1/2

- Here are two examples of how to create two variables in one line of VBA code

```
Dim Number1 As Integer, Number2 As Integer  
Dim Answer As String, Guess As String
```



```
' Create the first number in the range 1 to 100  
Number1 = Int(Rnd() * 100) + 1
```

```
' Create the second number in the range 1 to 100  
Number2 = Int(Rnd() * 100) + 1
```

```
' Calculate the answer and store it as string  
Answer = Number1 + Number2
```

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Math Game 2/2

Continued from the previous slide...

```
' Execute the loop at least once
```

```
Do
```

```
    ' Ask the question
```

```
    Guess = InputBox("What is " & Number1 _  
                      & " + " & Number2 & "?")
```

```
    ' Check the answer at the end of the loop
```

```
Loop While Answer <> Guess
```

Keep doing the loop
while this is true

```
MsgBox "Excellent, you have got the " _  
       & "correct answer!"
```

Randomness of the Rnd Function

- Unfortunately, you will find that every time you run your code you will get the same series of random numbers!

– For example,

- The first time your program asks a random math question:

1st time you run it:

What is 75 + 71?

- Later you run the program the second time it will ask the same question again!

2nd time you run it:

What is 75 + 71?

- That means any game which uses the random numbers will be the same every time you play it!
- To change this, you need to use `Randomize`

Ensuring the Sequence is Different Each Time

... The code for creating the variables is the same as before ...

Randomize ← You need to use Randomize to ensure that the
series of random numbers is different each time

... The remaining code is the same as before ...

' Create the first number, in the range 1 to 100

...

' Create the second number, in the range 1 to 100

...

' Calculate the answer and store it

... and so on ...

Because
Randomize has
been used, the
following
sequence of
random numbers
will be different
each time