NYU TANDON ONLINE

Data Types and Expressions

Module 2 Part 2
Itay Tal

05:01

`float` and `double` Data Types

NYU TANDON ONLINE

Data	Expressions	Control Flow
• `int`	• I/O expressions	• Sequential
• `float`	• Arithmetic expressions	
• `double`		

Media   Playback   Audio   Video   Subtitle   Tools   View   Help

float and double Data Types

NYU TANDON ONLINE

Kind of data: Real numbers (could have fractiona

Inner representation:
- double – Each data uses 8 bytes (64 bits)
- float – Each data uses 4 bytes (32 bits)

01:18   21:44

float and double Data Types

NYU TANDON ONLINE

```
int main(){
    int x;
    double y;

    x = 6;
    y = 7.658;

    return 0;
}
```

100	x : 6
104	y : 7.658
112	

Memory

02:03   21:44

Media Playback Audio Video Subtitle Tools View Help

float and double Data Types

NYU TANDON ONLINE

Kind of data: Real numbers (could have fractional part)

Inner representation:
- double – Each data uses 8 bytes (64 bits)
- float – Each data uses 4 bytes (32 bits)
- The numbers are represented by the floating point method (IEEE-754)

03:09 ———————————————————————— 21:44

Media Playback Audio Video Subtitle Tools View Help

Float & Double Data Types

NYU TANDON ONLINE

```
int main(){
    int x;
    double y;

    x = 6;
    y = 7.658;

    return 0;
}
```

$(6)_{10} = (00000000\ 00000000\ 00000000\ 00000110)_{2's}$

$(7.658)_{10} = (01000000\ 00011110\ 10100001\ 11001010\ 11000000\ 10000011\ 00010010\ 01101111)_{IEEE-754}$

	.
	.
100	0 0 0 0 0 1 1 0
x	0 0 0 0 0 0 0 0
	0 0 0 0 0 0 0 0
	0 0 0 0 0 0 0 0
104	0 1 1 0 1 1 1 1
	0 0 0 1 0 0 1 0
	1 0 0 0 0 0 1 1
	1 1 0 0 0 0 0 0
y	1 1 0 1 0 1 0 0
	1 0 1 0 0 0 0 1
	0 0 0 1 1 1 1 0
	0 1 0 0 0 0 0 0
112	.
	.
	.

Memory

03:59 ———————————————————————— 21:44

3 Data Types and Expression Lectures - Week 2 - Data Types and Expressions - Introduction to Programming in C++ - edX_2.ts - VLC media player

Media   Playback   Audio   Video   Subtitle   Tools   View   Help

Area of a Circle

NYU TANDON
ONLINE

Write a program that reads from the user a radius of a circle.

The program will then print area of this circle.

Example
Please enter the radius:
2.6
The area of a circle with radius of 2.6 is 21.2372

3 Data Types and Expression Lectures - Week 2 - Data Types and Expressions - Introduction to Programming in C++ - edX_2.ts - VLC media player

Media   Playback   Audio   Video   Subtitle   Tools   View   Help

Area of a Circle

NYU TANDON
ONLINE

Theorem:

Let **C** be a circle with a radius of length **r**.

We have:
(Area of **C**) = $\circledP \cdot \mathbf{r}^2$

C: 01_first_cpp_program.cpp   C: 02_data_type_and_expression_part1.cpp   C: 03_data_type_and_expression_part2.cpp   C math.h ✕   C/C++ Configurations

C: > Program Files > mingw-w64 > i686-8.1.0-posix-dwarf-rt_v6-rev0 > mingw32 > i686-w64-mingw32 > include > C math.h > ≡ M_PI

```
33    #define TLOSS      _TLOSS
34    #define PLOSS      _PLOSS
35
36    #endif
37    #endif
38
39    #if !defined(__STRICT_ANSI__) || defined(_POSIX_C_SOURCE) || defined(_POSIX_SOURCE) || defined(_XOPEN_SOURCE) || defined(_GNU_SOURCE) || defin
40    #define M_E        2.7182818284590452354
41    #define M_LOG2E    1.4426950408889634074
42    #define M_LOG10E   0.43429448190325182765
43    #define M_LN2      0.69314718055994530942
44  💡 #define M_LN10     2.30258509299404568402
45    #define M_PI       3.14159265358979323846
46    #define M_PI_2     1.57079632679489661923
47    #define M_PI_4     0.78539816339744830962
48    #define M_1_PI     0.31830988618379067154
49    #define M_2_PI     0.63661977236758134308
50    #define M_2_SQRTPI 1.12837916709551257390
51    #define M_SQRT2    1.41421356237309504880
52    #define M_SQRT1_2 0.70710678118654752440
53    #endif
54
55    #ifndef __STRICT_ANSI__
56    /* See also float.h  */
57    #ifndef __MINGW_FPCLASS_DEFINED
58    #define __MINGW_FPCLASS_DEFINED 1
59    /* IEEE 754 classication */
60    #define _FPCLASS_SNAN 0x0001   /* Signaling "Not a Number" */
61    #define _FPCLASS_QNAN 0x0002   /* Quiet "Not a Number" */
62    #define _FPCLASS_NINF 0x0004   /* Negative Infinity */
63    #define _FPCLASS_NN 0x0008     /* Negative Normal */
64    #define _FPCLASS_ND 0x0010     /* Negative Denormal */
65    #define _FPCLASS_NZ 0x0020     /* Negative Zero */
66    #define _FPCLASS_PZ 0x0040     /* Positive Zero */
```

⊗ 1 ⚠ 0   Ln 45, Col 1 (36 selected)   Spaces: 2   UTF-8   LF   C++   Win32

3 Data Types and Expression Lectures - Week 2 - Data Types and Expressions - Introduction to Programming in C++ - edX_2.ts - VLC media player

Media   Playback   Audio   Video   Subtitle   Tools   View   Help

Type Casting

NYU TANDON
ONLINE

```
int main(){
    int x1, x2;
    double y1, y2;

    x1 = 6;
    y1 = 6.7;

    y2 = 66;


    return 0;
}
```

Casting
converting the representation of a data
from one type to another type

14:53   21:44