

Numeric Data Types, Literals, and the str Data Type

<u>Data types</u>: categorize value in memory

 e.g., int for integer, float for real number, str used for storing strings in memory

- <u>Numeric literal</u>: number written in a program

 No decimal point considered int, otherwise, considered float
- Some operations behave differently depending on data type
- Example:
- >>> a = 5 >>> b = 7 >>> print(a + b)

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>>> a = "5" >>> b = "7" >>> print(a+b) 57

Variable Reassignment

- Variables can reference different values while program is running
- <u>Garbage collection</u>: removal of values that are no longer referenced by variables
 - Carried out by Python interpreter
- A variable can refer to item of any type
 - Variable that has been assigned to one type can be reassigned to another type



Reassigning a Variable to a Different Type

• A variable in Python can refer to items of any type >>> x = 90

>>> x = "Take me to your leader"

 If you're using the same variable name for different uses, Python will assume you mean the most recent use

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Performing Calculations

- Math expression: performs calculation and gives a value
 - <u>Math operator</u>: tool for performing calculation
 - Operands: values surrounding operator
 - Variables can be used as operands
 - Resulting value typically assigned to variable
- Two types of division:
- / operator performs floating point division
- / / operator performs integer division
 - Positive results truncated, negative rounded away from zero

The Exponent Operator and the Remainder Operator

- Exponent operator (**): Raises a number to a power
 - $-x \star y = x^y$
- Remainder operator (%): Performs division and returns the remainder
 - a.k.a. modulus operator
 - -e.g.,4%2=0, 5%2=1
 - Typically used to convert times and distances, and to detect odd or even numbers

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Operator Precedence and Grouping with Parentheses

- Python operator precedence:
 - 1. Operations enclosed in parentheses
 - Forces operations to be performed before others
 - 2. Exponentiation (**)
 - Multiplication (*), division (/ and //), and remainder (%)
 - 4. Addition (+) and subtraction (-)
- Higher precedence performed first
 - Same precedence operators execute from left to right



Converting Math Formulas to Programming Statements

- · Operator required for any mathematical operation
- When converting mathematical expression to programming statement:
 - May need to add multiplication operators
 - May need to insert parentheses

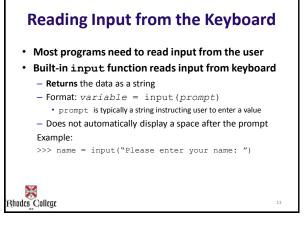
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Performing Calculation Practice

You're working at a fast food restaurant where a burger costs \$3.99 and French fries cost \$1.99.

- Write a program (save this as a script) that uses 2 variables to store these two prices.
- Your program should then print out the cost of buying 2 burgers and 3 fries.
- If you finish early, make your program add in 9.25% sales tax.





Reading Numbers with the input Function

- input function always returns a string
- · Built-in functions convert between data types
 - int(item) converts item to an int
 - float (item) converts item to a float
 - <u>Nested function call</u>: general format: function1(function2(argument))
 - value returned by function2 is passed to function1
 - Type conversion only works if item is valid numeric value, otherwise, throws exception

Input from Keyboard

- For integers:
 - variable = int(input("Prompt"))
- For floats:
 - variable = float(input("Prompt"))
- For strings:

```
variable = input("Prompt")
```

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Practice

- 1. Modify your food program (burger and fries) to prompt the user for the price of a burger and the price of fries instead of having those values hard-coded in.
- 2. Write a short program (new file) that will calculate the proper tip on a bill.
 - Prompt the user for the total cost of the bill.
 - Assume you are leaving an 18% tip.
 - Calculate the total tip for the bill.
 - Output the tip amount
 - If you're done early, prompt the user for the tax rate, then use it to calculate the total cost of the bill with tax and tip.

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