

## COMP 141

CS1: Programming Fundamentals

math operations,  
input from keyboard



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### Performing Calculations

- **Math expression:** performs calculation and gives a value
  - Math operator: 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

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### The Exponent Operator and the Remainder Operator

- **Exponent operator (\*\*):** Raises a number to a power
  - $x^{**} y = x^y$
- **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 (\*\*)
  3. Multiplication (\*), division (/ and //), and remainder (%)
  4. Addition (+) and subtraction (-)
- **Higher precedence performed first**
  - Same precedence operators execute from left to right

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## 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.

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## Reading Input from the Keyboard

- Most programs need to read input from the user
- Built-in `input` function reads input from keyboard
  - Returns the data as a string
  - Format: `variable = input(prompt)`
    - `prompt` is typically a string instructing user to enter a value
  - Does not automatically display a space after the prompt

Example:

```
>>> name = input("Please enter your name: ")
```

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## 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`
- Nested function call: 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

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## 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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