Introductory Slides for COT3502 – Computer Model Formulation

What is a program?

"A sequence of instructions that tells a computer to do something"

Chocolate Cake

1. *Preheat oven to 350F and…*
2. *Microwave 4 oz chopped chocolate for…*
3. *…*

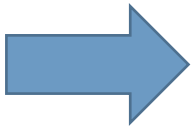
```
Check whether x is prime

1. Check if x is divisible by 2
2. Check if x is divisible by 3
3. …
```

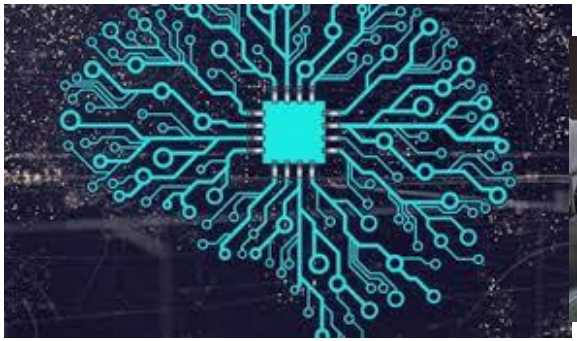
What can programs make computers do?

Anything! From simple calculations to the technological cutting edge!

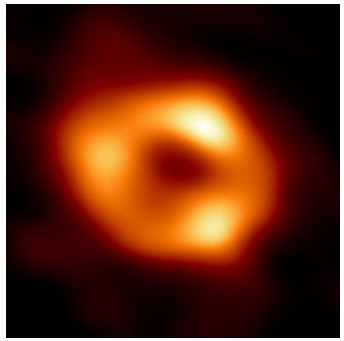
```
Check
whether x
is prime
```



AI / Machine Learning



Astronomy Data Analysis

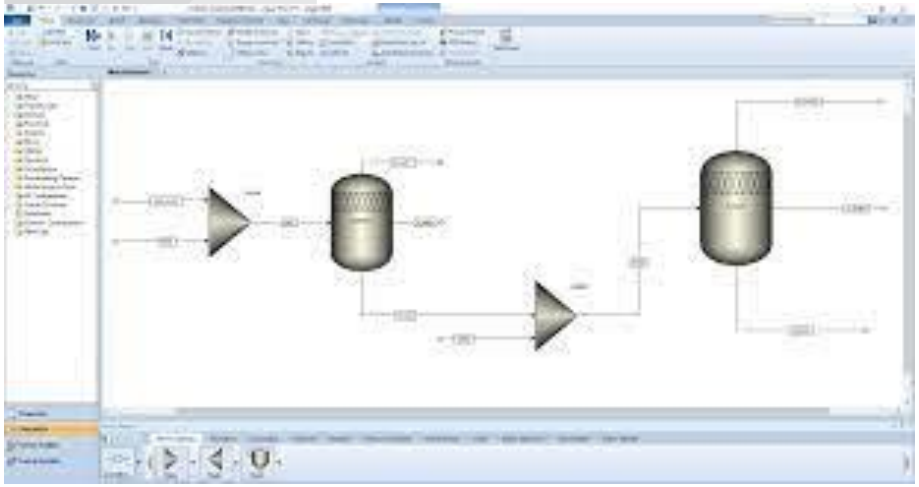


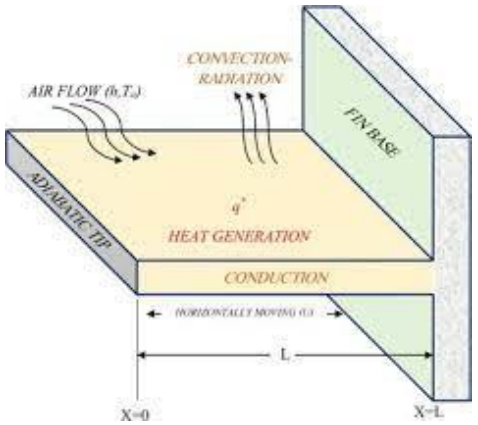
Interactive Software

What do chemical engineers write programs to do?

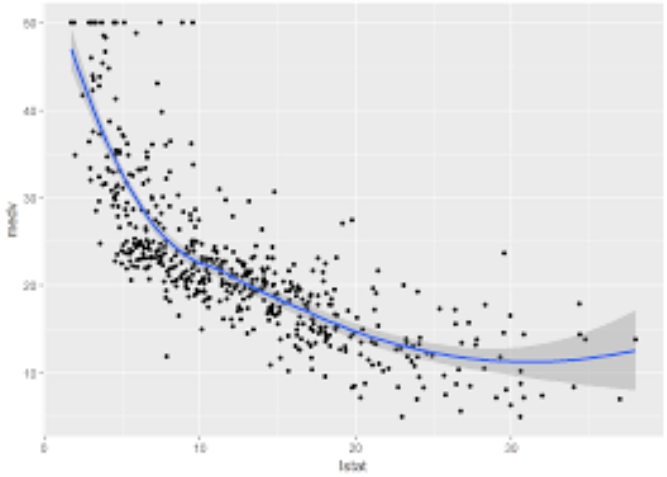
Mass & Energy Transfer Modeling

Process Control / Automation





Regression & Optimization



What will you do in COT3502?

Do math you couldn't do by hand…

$$\int_0^5 x^2 \exp(-x)dx$$

$$\frac{dP}{dt} = -Pm + bHP$$

$$\frac{dH}{dt} = Hr - aHP$$

$$\begin{cases} P = P(t) & \text{Number of Predators} \\ H = H(t) & \text{Number of Prey} \end{cases}$$

Xylene: $0.07D_1 + 0.18B_1 + 0.15D_2 + 0.24B_2 = 0.15F$

Styrene: $0.04D_1 + 0.24B_1 + 0.10D_2 + 0.65B_2 = 0.25F$

Toluene: $0.54D_1 + 0.42B_1 + 0.54D_2 + 0.10B_2 = 0.40F$

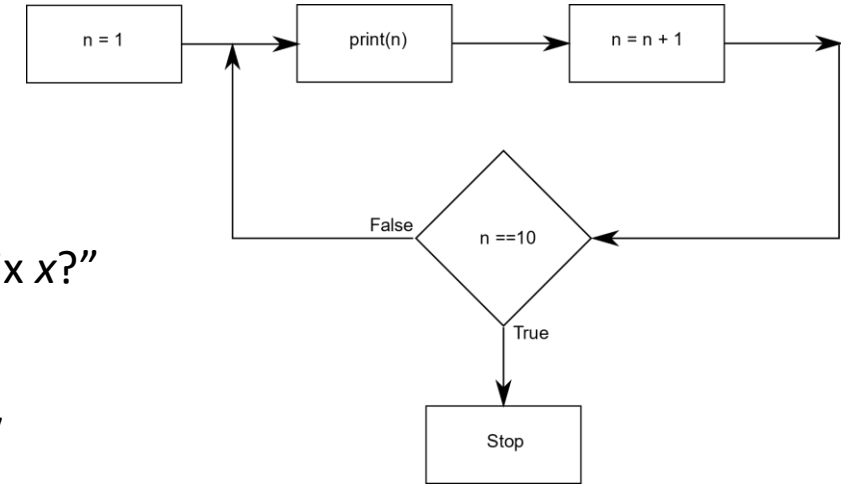
Benzene: $0.35D_1 + 0.16B_1 + 0.21D_2 + 0.01B_2 = 0.20F$

Learn new ways to approach problems…

"How do I put *a, b,* and *c* together to do *x*?"

"How do I modify *a* to do *b* instead?"

"If *x* isn't working, how do I devise a plan to fix *x*?"



…and anything else you explore along the way

```
In [15]: import antigravity
```

```
In [15]: import this.py
```

We will be using Python in COT3502 – Why Python?

Easy to learn!

Print in Python:

```
print("Hello World")
```

Print in C++:

```
std::cout << "Hello World" << std::endl;
```

Free!

(You can download this on any computer at any time)

We will be using Python in COT3502 – Why Python?

Versatile!

Math, arrays and matrices

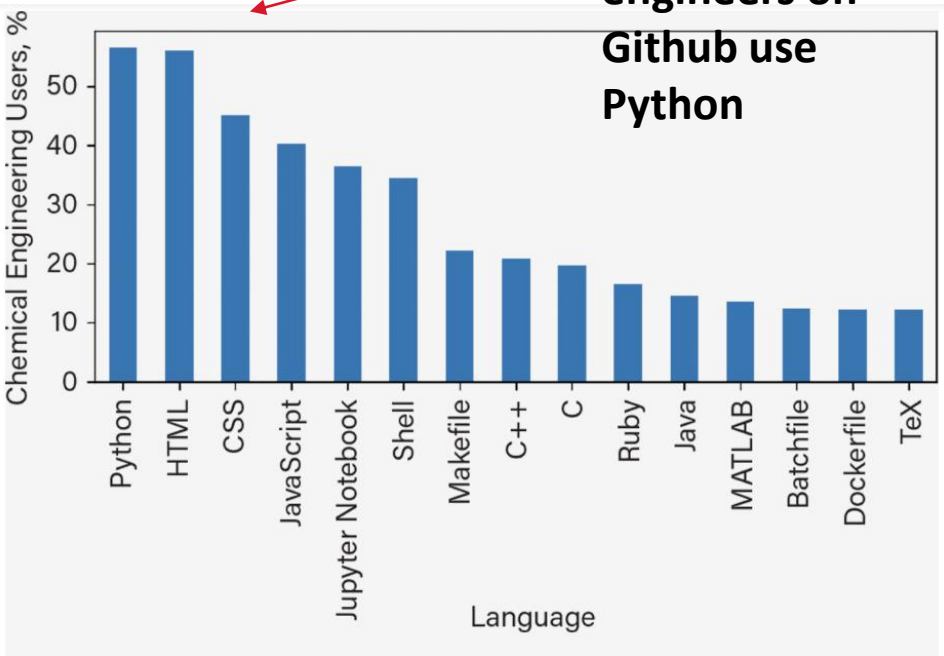
Advanced functions and solvers

Data / spreadsheet operations

Plotting tools

Popular!

Over 50% of chemical engineers on Github use Python



…all in one language