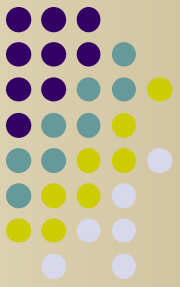


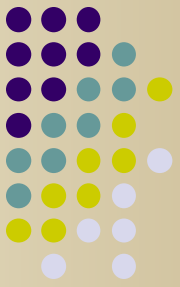
# ENGR/CS 101 CS Session

## Lecture 4

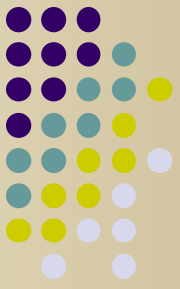


- Log into Windows/ACENET (reboot if in lab machine is in Linux)
- Start IDLE (Python GUI) 2.7
- Create a New File
- Use Save As to save this file with a new name like 'lecture04.py'

# Outline



- More practice with functions and input loops



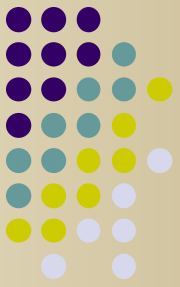
# Problem Statement

The cost of borrowing money is computed using an interest rate, usually expressed as an annual percentage rate (APR). The length of a loan usually is expressed as the number of monthly payments to be paid (e.g., 60 months for a car loan). The formula for computing a monthly loan payment (for any kind of loan with interest compounded monthly) is

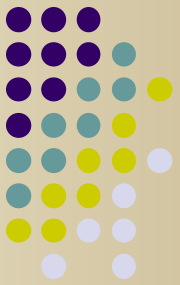
$$\textit{payment} = \frac{iP}{1 - (1 + i)^{-n}}$$

where  $P$  = principal (the amount borrowed),  $i$  = monthly interest rate (1/12 of the APR), and  $n$  = number of monthly payments.

# Program Specification



Write a program that computes the monthly payment of a loan. The program should repeatedly prompt the user for the purchase price, a down payment amount, the annual interest rate (in decimal form, e.g. .05 for 5%), and the total number of monthly payments. The program should display the amount borrowed and the monthly loan payment. The payment must be computed by using a function. Your program must interact with the user in exactly the manner shown on the next slide, stopping when the user enters 0 for the purchase price.



# Sample Run

## LOAN PAYMENT CALCULATOR

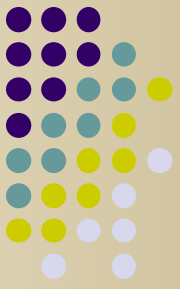
```
Enter the purchase price (0 to quit): 18000
Enter the down payment: 2000
Enter the annual interest rate (in decimal form): .07
Enter the number of monthly payments: 60
The amount borrowed is $16000.00
The monthly payment will be $316.82
```

```
Enter the purchase price (0 to quit): 100000
Enter the down payment: 12000
Enter the annual interest rate (in decimal form): .07
Enter the number of monthly payments: 120
The amount borrowed is $88000.00
The monthly payment will be $1021.75
```

```
Enter the purchase price (0 to quit): 0
```

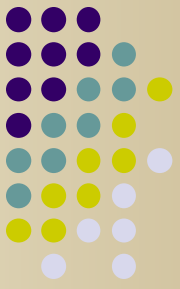
**All done**

# Loan Payment Function Analysis & Design



- Analysis: what data is needed and how does it move through the function?
  - Received data comes into the function
  - Returned result leaves the function
- Design: what algorithm is used to compute result?
- Write these as comments in code file

# Loan Payment Function Implementation

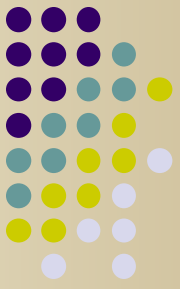


- Write the Python implementation of this function.
- Reminder: Python function declaration syntax:

```
def <name>(<parameter list>):  
    <computation statements>  
    return <result>    // if needed
```
- Reminder: Body of function must be ***indented***.
- Test function by using Run -> Run Module, then calling the function at the prompt.

```
>>> computeLoanPayment(16000, .07/12, 60)  
>>> 316.81917664559154
```

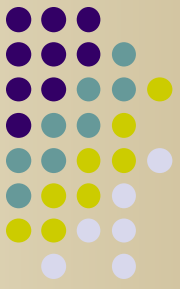
# Main Program Function Analysis & Design



- Analysis - what data is needed and computed?
  - Input – data provided by the user
  - Output – data displayed as the result
- Design: what algorithm is used to compute result?
- Write these as comments in code file



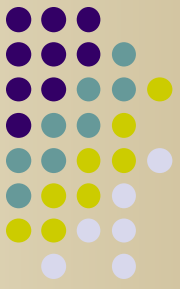
# Main Program Function Implementation



- Write the Python code for the main program function.
- Formatting output
  - Use special 'escaped' character '`\n`' in a string to produce a newline in the output. E.g., before the prompt for the purchase price.
  - Use format specifiers and 'modulo formatting' to specify the number of digits to be displayed. E.g., money amounts have 2 digits. Syntax is:

```
print 'Amount borrowed is $%.2f' % amountBorrowed
```

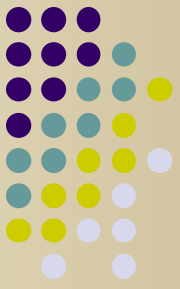
# Main Program Function Implementation



- Reminder: The syntax for a Python input loop:

```
<var> = input(<prompt>)\nwhile <loop test using var>:\n    <steps to be repeated>\n    <var> = input(<prompt>)
```

- Reminder: Body of loop must be *indented*.



# Homework 1

- Also posted to class webpage. Assignment has similar structure as programs done in last two classes. Due next Monday.
- Instructions on how to submit assignment will be given in class on Friday.
- KC-267 is open Thursday and Friday afternoons. Cypherlock code is: