Assignments

- Write a program that creates a list containing tuples with elements in the multiplication table, i.e.,
  \[
  [(1, 1, 1), (1, 2, 2), \ldots (10, 9, 90), (10, 10, 100)]
  \]

- Write a program that creates two list containing tuples with elements in the multiplication table – one for odd numbers and one for even numbers
  \[
  [(1, 1, 1), (1, 2, 2), \ldots (3, 1, 3), (3, 2, 6) \ldots ]
  [ (2, 1, 2), (2, 2, 4), \ldots (4, 1, 4), (4, 2, 8) \ldots ]
  \]
Assignments

- Write a simple calculator that accepts the input in the Reverse Polish notation (i.e., the postfix notation)
  - the expressions are accepted as commandline arguments
  - e.g., `pcalc.py 1 2 3 + +
  - prints out 6
Assignments

• Write a program that for a given string prints out number of occurrences of individual characters

  e.g., mississippi
    m: 1 times
    i: 4 times
    ...

Assignment

• Implement selection sort
  ▪ a function that takes a list of ints and sorts it by selection sort

• overview of selection sort
  ▪ finds the smallest value in the whole array (0:n) and swaps it with the first item
  ▪ finds the smallest value in the rest of the array (1:n) and swaps it with the second item
  ▪ finds the smallest value in the rest of the array (2:n) and swaps it with the third item
  ▪ etc. until we reach the end of the array
Assignment

- Implement heapsort (without help of heapq)
  - a function that takes a list of ints and sorts it by heapsort

- overview of heapsort
  - sorting using a heap
  - heap – binary tree where each node has smaller value than its children
  - heap is constructed directly in the array
  - children of the node i are 2*i+1 and 2*i+2

- pseudocode

```python
procedure heapsort(a, count)
    heapify(a, count)
    end = count - 1
    while end > 0 do
        swap(a[end], a[0])
        end = end - 1
        siftDown(a, 0, end)
```