CS 100
Lab 10 - Sorting Algorithms

1. Given the three sorting functions below, i.e. insertion, bubble and selection:

    a. Given x = [38, 27, 43, 3, 9, 82, 10]
       What are the intermadiate states of the vector x in each algorithm ?

    b. Explain how does each sorting algorithm works.

```
function x = insertionsort(x)
% Insertion sort
n = length(x);
for j = 2:n
    pivot = x(j);
    i = j;
    while ((i > 1) && (x(i - 1) > pivot))
        x(i) = x(i - 1);
        i = i - 1;
    end
    x(i) = pivot;
end
end
```

```
function x = bubblesort(x)
% Bubble sort
n = length(x);
while (n > 0)
    % Iterate through x
    nnew = 0;
    for i = 2:n
        % Swap elements in wrong order
        if (x(i) < x(i - 1))
            x = swap(x,i,i - 1);
            nnew = i;
        end
    end
    n = nnew;
end
end

function x = swap(x,i,j)
% Swap x(i) and x(j)
% Note: In practice, x xhould be passed by reference

val = x(i);
x(i) = x(j);
x(j) = val;
end
```

```
function x = selectionsort(x)
% Seletion sort
n = length(x);
for j = 1:(n - 1)
    % Find jth smallest element
    imin = j;
    for i = (j + 1):n
        if (x(i) < x(imin))
            imin = i;
        end
    end

    % Put jth smallest element in place
    if (imin ~= j)
        x = swap(x,imin,j);
    end
end

end

function x = swap(x,i,j)
% Swap x(i) and x(j)
% Note: In practice, x xhould be passed by reference

val = x(i);
x(i) = x(j);
x(j) = val;

end
```