Armstrong State University
Engineering Studies
MATLAB Marina – Recursion Exercises

1. What distinguishes a recursive function from a "regular" function?
2. What is a stack and why is one needed for recursive functions?
3. What are the two parts of a recursive function?
4. What is a risk with recursive functions if the base case does not move toward the terminating case?
5. Write a recursive function named `linearSearchRecursive` that uses recursion rather than iteration to search a 1D array for all instances of a vale. The MATLAB code for an iterative implementation of a `linearSearch` function is given in Figure 1. The function returns a list of indices where the value was found in the array x.

```
function result = linearSearch(x, value)
result = [];
for k = 1:1:length(x)
    if x(k) == value
        result = [result, k];
    end
end
end
```

Figure 1, `linearSearch` Function (omitting comments)

6. Write a test program that will test your `linearSearchRecursive` function developed for Problem 5 for three cases: a vector and value where there are no matches, a vector and value where there is exactly one match, and a vector and value where there are two or more matches. Run the test program and verify that the `linearSearchRecursive` function operates correctly. What does your `linearSearchRecursive` return when called for an empty vector and a value? What does your `linearSearchRecursive` return when called with one or both of the vector and value missing, for example `r = linearSearch([1, 2, 3, 4])`?

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