Problem 2. Let $A = (a_{ij})$ be a matrix and $(b_1, \ldots, b_n)$ and $(x_1, \ldots, x_n)$ be vectors with real entries. Using Θ notation, describe the number of arithmetic operations in the algorithm

```
for i = 1, ..., n
    for j = 1, ..., i - 1
        x_i = b_i - a_ij x_j
    end
    x_i = b_i / a_ii
end
```

Let C be the # of arithmetic operations (flops).

$$C = \sum_{i=1}^{n} \left(\sum_{j=1}^{i-1} 2 + 1 \right) = \sum_{i=1}^{n} 2(i-1) + n$$

$$= 2 \sum_{i=1}^{n-1} + n = 2 \frac{(n-1)n}{2} + n = n^2.$$

$$C = \Theta(n^2).$$

Problem 3. Give a recursive algorithm for computing na, where $n \in Z^+$ and $a \in R$.

$n = 1 \Rightarrow na = a$

$na = (n-1)a + a$

```
procedure na(n, a)
    if n = 1 then
        output = 1
    else
        output = na(n-1, a) + a
    end
{output}.
```