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 $\Theta$ notation, describe the number of arithmetic operations in the algorithm

\begin{verbatim}
for i = 1, \ldots, n
    for j = 1, \ldots, i - 1
        $x_i = b_i - a_{ij}x_j$
    end
    $x_i = b_i/a_{ii}$
end
\end{verbatim}

let $C$ be the number of arithmetic operations (flops).

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

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

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

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

$$
n = 1 \Rightarrow na = a
$$

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

procedure na(n, a)
    if $n = 1$ then
        output = 1
    else
        output = na(n-1, a) + a
    end
end

output 3.