1. (a)

$$T(n) = T\left(\frac{n}{2}\right) + 10$$
$$T\left(\frac{n}{2}\right) = T\left(\frac{n}{4}\right) + 10$$
$$\ldots$$
$$T\left(\frac{n}{n \div 2}\right) = T\left(\frac{n}{n}\right) + 10$$
$$T\left(\frac{n}{n}\right) = a$$
$$T\left(\frac{n}{n \div 2}\right) = a + 10$$
$$T\left(\frac{n}{n \div 4}\right) = (a + 10) + 10$$
$$\ldots$$
$$T(n) = a + 10\log_2 n$$

$F(n) = \log_2 n$
$T(n)$ is $O\big(F(n)\big)$

(b)

$$T(n) = T\left(\frac{n}{2}\right) + n^2$$
$$T\left(\frac{n}{2}\right) = T\left(\frac{n}{4}\right) + \left(\frac{n}{2}\right)^2$$
$$\ldots$$
$$T\left(\frac{n}{n \div 2}\right) = T\left(\frac{n}{n}\right) + \left(\frac{n}{n \div 2}\right)^2$$
$$T\left(\frac{n}{n}\right) = a$$
$$\ldots$$
$$T\left(\frac{n}{n \div 2}\right) = a + \left(\frac{n}{n \div 2}\right)^2$$
$$T\left(\frac{n}{n \div 4}\right) = \left(a + \left(\frac{n}{n \div 2}\right)^2\right) + \left(\frac{n}{n \div 4}\right)^2$$
$$\ldots$$
$$\mathrm{T(n)} = n^2 + (a + \left(\frac{n}{n \div 2}\right)^2 + \left(\frac{n}{n \div 4}\right)^2 + \left(\frac{n}{n \div 8}\right)^2 + \ldots)$$

$F(n) = n^2$
$T(n)$ is $O(F(n))$

2. $int[\,]arr\ =\ \{\ ...\};$

$int\ n =\ arr.length;$

$int\ result\ =\ ArraySum(\ arr, n\ );$

$ArraySum(\ arr, n\ )\ \ \ =\ ArraySum(\ arr, n-1\ ) +\ arr[\ n\ -1\ ]$

$ArraySum(\ arr, n-1\ )\ =\ ArraySum(\ arr, n-2\ )\ +\ arr[\ n$

...

$ArraySum(\ arr, n-(n-2)) = ArraySum(\ arr, n-(n-1)) + arr[1]$

$ArraySum(\ arr, n-(n-1) = arr[0]$

$ArraySum(arr, n-(n-2)) = arr[0] + arr[1];$

...

$ArraySum(arr, n-1) = (arr[n-3] + arr[n-4] + \cdots + arr[0]) + arr[n-2]$

$ArraySum(arr, n) = (arr[n-2] + arr[n-3] + \cdots + arr[0]) + arr[n-1]$

Then, $result = arr[n-1] + arr[n-2] + \cdots + arr[0]$

There are 2 process when call the ArraySum() ① the return ② the summation.

Let R is the return time, and S is the summation time.

Answer $T\big(ArraySum(arr, n)\big) = nR + (n-1)S$