CSE 2321 Foundations I Spring, 2024 Dr. Estill

Homework 5 Due: Friday, March 1

1.) (25 points each) Write down a summation version of the run-time of each of the following algorithms and then figure out and prove the asymptotic complexity (Θ-set) of that run-time function.

(a)
```
FUNCTION W_a(n ∈ ℕ)
    x ← 0
    i ← 1
    WHILE i ≤ n^2 DO
        x++
        i ← 5i
    RETURN(x)
```

(b)
```
FUNCTION W_b(n ∈ ℕ)
    x ← 0
    FOR i ← 1 TO n^2 DO
        j ← 3
        WHILE j ≤ i DO
            x++
            j ← 2j
    RETURN(x)
```

(c)
```
FUNCTION W_c(n ∈ ℕ)
    x ← 0
    i ← n
    WHILE i > 1 DO
        FOR j ← 1 TO n^2 DO
            x++
        i ← i/2
    RETURN(x)
```

(d) FUNCTION $W_d(n \in \mathbb{N})$

```
x ← 0
i ← 0
WHILE i < n DO
        j ← 1
        WHILE j < i DO
                x++
                j ← 2j
        i ← i + √n
RETURN(x)
```