• Question 1: Finding the minimum of \( n \) integers.

```c
int min(int A[], n) {
    min = A[1];
    for (i = 2, i <= n; i++) {
        if (min > A[i])
            min = A[i];
    }
}
```
Give a good estimate of the running time of this routine. In other words, #steps executed by the min routine is big-O of what function of \( n \)?

min is \( O(n) \) the loop runs \( n-1 \) times.

• Question 2: Let \( f(n) = \log_2 n \); Let \( g(n) = 32976n + 1/n \) Give a good estimate of the growth rate of \((f + g)(n)\). In other words, \( f(n)+g(n) \) is big-O of what function of \( n \)?

\[(f+g)(n) = O(\max(f(n), g(n))) = O(n) \] (the log function grows slower than \( n \); same for \( n^{-1} \) which doesn’t grow at all.

• Question 3: The integer 15,435 expressed as a product of primes is \( 3^2 \cdot 5^1 \cdot 7^3 \) Similarly 1848 = \( 2^3 \cdot 3^1 \cdot 7^1 \cdot 11^1 \) What is the greatest common divisor of 15435 and 1848? \( 2^0 \cdot 3^0 \cdot 5^0 \cdot 7^1 \cdot 11^0 \) You can give your answers as products of powers of primes.

What is the least common multiple of 15435 and 1848? \( 2^3 \cdot 3^2 \cdot 5^1 \cdot 7^3 \cdot 11^1 \) Hint: look at the prime representations; what divisors are common? What are the multiples of both?

• Question 4: Consider matrix \( A \) below. Give the matrix for \( A^7 \).

\[
\begin{bmatrix}
1 & 0 & 0 \\
0 & 1 & 0 \\
0 & 0 & 1
\end{bmatrix}
= A \quad \text{(A is the identity matrix, so } A^n = A \text{ for all } n \geq 0) \\
\begin{bmatrix}
1 & 0 & 0 \\
0 & 1 & 0 \\
0 & 0 & 1
\end{bmatrix}
= A^7
\]