- Question 1: Finding the minimum of *n* integers.

```
null 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?

$(f+g)(n) = \mathbf{O}(\max(f(n), g(n))) = \mathbf{O}(n)$ (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? $2^0 \cdot 3^0 \cdot 5^0 \cdot 7^1 \cdot 11^0$

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?

You can give your answers as products of powers of primes.

- Question 4: Consider matrix A below. Give the matrix for A^7.

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