Definition of Big θ:

If f(n) = O(g(n)) and f(n) = Ω(g(n)), then f(n) = θ(g(n)).

f(n) = O(g(n)), if there are positive constants c and n₀ such that f(n) ≤ c \* g(n) for all n ≥ n₀.

f(n) = Ω(g(n)), if there are positive constants c and n₀ such that f(n) ≥ c \* g(n) for all n ≥ n₀.

11. n² + n/2 + 1 = θ(n³)

False, no constants can be chosen since g(n³) ≥ f \* g(n²) for all c.

f(n²) = O(g(n³)) because for c = 2, n₀ = 2, g(n³) ≥ f \* g(n²) for all n ≥ n₀.

f(n²) != Ω(g(n³)) because for any c, g(n³) ≥ f \* g(n²) for all n ≥ n₀. Eg if c = 5, for all n ≥ n₀=5, g(n³) ≥ f \* g(n²) .

12.

False, because no constants can be chosen since g(log64) ≥ f (1) for all c.

g = O(f) but f != O(g) as log64 = 6 > 1.

Likewise, g != Ω(f) but f = Ω(g) because 1 < 6.

13.

False. Because no constants can be chosen since f(nlogn) >= g(logn) for all c.

f(nlogn) = Omega(g) but g != Omega(f) because for any n, nlogn >= logn.

Likewise, f(nlogn) != O(g) but g = O(f) .

14.

False. Because no constants can be chosen since 2^n >= n for all c

15.

True since n^5/n^2 = n^3. Let c be 5 and n\_0 be 5. Then 5(n^5/n^2) always > n^3.

Likewise, 5(n^3) always >= (n^5/n^2). Therefore 15 is true.