Q1

$T(n) = \log_2^n + \log_2^n$

By ignoring 2 we can write it as

$T(n) = \log^n + \log n \Rightarrow 2 \log n$

Big-Oh $\Rightarrow \log n$

Q2

$T(n) = 1 + \log_2^n + 1 + \log_2^n + \log_2^n$

$= 2 + 3\log_2^n \Rightarrow 2 + 3\log n$

Big-Oh $= \log n$

Q3

$T(n) = 1 + \log_3^n + 1 + \log_3^n + \log_3^n$

$= 2 + 3\log_3^n$

Big-Oh $= \log n$

Q4

$$T(n) = 4 + \frac{n}{2} + 1 + 2\frac{n}{2} + \frac{n^2}{4} + \frac{n}{2} + 2\frac{n^2}{4} + \frac{n^2}{4}\left(\log_2 n + 1\right)$$
$$+ \frac{n^2}{4}\log_2 n$$
$$+ \frac{n^2}{4}\log_2 n$$

$$= 5 + 4\frac{n}{2} + 4\frac{n^2}{4} + 3\frac{n^2}{4}\log_2 n$$

$$= 5 + 2n + n^2 + \frac{3}{4}n^2 \log_2 n$$

Big-O(n) = $n^2 \log n$ Answer.

Q5

$$T(n) = 4 + \frac{n}{2} + 1 + \frac{n}{2} + \frac{n}{2} + \frac{n}{2}\log_2 n + \frac{n}{2} +$$
$$\frac{n}{2}\log_2 n + \frac{n}{2}\log_2 n + \frac{n}{2}\log_2 n \log_2 n + \frac{n}{2}\log_2 n$$
$$+ \frac{n^2}{2}\log_2 n + \frac{n^2}{2}\log_2 n$$

$$T(n) = 5 + 4\frac{n}{2} + 4\log_2 n + 2\frac{n}{2}\log_2 n +$$
$$2\frac{n^2}{2}\log_2 n$$

$T(n) = 5 + 2n + 4\log_2^n + n\log_2^n + n^2\log_2^n$

Big-Oh = $n^2\log_2^n$ Answer.

Q6

$T(n) = 1 + 1 + (n+1) + n + n + n$

$= 1 + 1 + n + 1 + n + n + n$

$= 3 + 4n$

Big-Oh = n Answer.

Q7

$T(n) = 1 + n + 1 + n + n + n^2 + n + n^2 + n^2 + n^2 + n^2$

$T(n) = 2 + 4n + 5n^2$

Big-Oh = n^2