Problem 2:

Total number of operations = $10^{10} \times 60 \times 60 = 3.6 \ x \ 10^{13}$

1)

$$n^2 \ = \ 3.6 \cdot 10^{13}$$

$$\sqrt{n^2} = \sqrt{3.6 \times 10^{13}}$$

$$n \ = \ 6,000,000$$

2)

$$n^3 = 3.6 \times 10^{13}$$

$$\sqrt[3]{n^3} = \sqrt[3]{3.6 \times 10^{13}}$$

$$n = 33019$$

3)

$$100n^2 = 3.6 \times 10^{13}$$

$$n^2 = 3.6 \times 10^{11}$$

$$\sqrt{n^2} = \sqrt{3.6 \times 10^{11}}$$

$$n = 600,000$$

4)

$$n\log n = 3.6 \times 10^{13}$$

$$ne^n = e^{3.6 \times 10^{13}}$$

$$using \ Lambert \ W \ equation$$

$$n = 1.290095 \times 10^{12}$$

5)

$$2^n = 3.6 \times 10^{13}$$

$$n = log_2(3.6 \times 10^{13})$$

$$n = 45$$

6)

$$2^{2^n} = 3.6 \times 10^{13}$$

$$2^n = log_2(3.6 \times 10^{13})$$

$$n = log_2\left(log_2(3.6 \times 10^{13})\right)$$

$$n = 5$$