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$$1) a) S(n) = \frac{b-a}{2^n}$$

The size of the interval gets divided by 2 for every iteration, or dividing $b-a$ ($S(0)$) by 2^n with n being an iteration number, this equation will give us the size of the interval at that iteration.

b) Yes, the maximum possible error can be computed from $S(n)$, as the error can not exceed the bounds of the interval. To represent the error using $S(n)$, we must multiply it by $\frac{1}{2}$:

$$e \leq \frac{1}{2} S(n) = \frac{1}{2} \frac{b-a}{2^n} = \frac{b-a}{2^{n+1}}$$

↓

$$e \leq \frac{b-a}{2^{n+1}}$$

$$c) 10^{-4} = \frac{1-0}{2^{n+1}}$$

$$2^{n+1} = 10^4$$

$$\log_2 2^{n+1} = \log_2 10^4$$

$$n+1 = 13.29$$

$$n = 12.29$$

13 iterations

$$10^{-8} = \frac{1-0}{2^{n+1}}$$

$$\log_2 2^{n+1} = \log_2 10^8$$

$$n = 25.58$$

26 iteration