10. A)

$$f'(x) = \underbrace{\frac{\bar{f}(x+h) - \bar{f}(x-h)}{2h}}_{\text{numerical derivative}} - \underbrace{\frac{h^2 B}{6} - \frac{E(x+h) - E(x-h)}{2h}}_{\text{truncation error} \quad \text{roundoff error}}$$

$$f'(x) = \underbrace{\bar{f}'(x)}_{\text{numerical derivative}} - \underbrace{g(h)}_{\text{combined errors}}$$

$\longrightarrow$ * minimize $g(h)$ * $\longleftarrow$

$$g(h) = \frac{h^2 B}{6} + \frac{E(x+h) - E(x-h)}{2h}$$

$$g(h) = \left[\frac{B}{6}\right]\left[h^2 + \frac{3\left(E(x+h) - E(x-h)\right)}{Bh}\right]$$

$$g(h) \leq \left[\frac{B}{6}\right]\left[h^2 + \frac{3\hat{E}}{h}\right]$$

$$g(h) \leq \left[\frac{B}{6}\right]\left[h^2 + \frac{3\epsilon_u \bar{E}}{h}\right]$$

$$g(h) \leq \left[\frac{B}{6h}\right]\left[h^3 + 3\epsilon_u \bar{E}\right]$$

$g(h)$ is minimized with $h = O(\sqrt[3]{\epsilon_u})$
to accomodate where $|x| >> 1$

$$h = \sqrt[3]{\epsilon_m} \max(1, |x|)$$