

7) Avoiding cancellation errors

(a) $y = \sqrt{x+\delta} - \sqrt{x}$ where δ - small

We compute instead

$$y = \frac{\delta}{\sqrt{x+\delta} + \sqrt{x}}$$

(b) $y = \underbrace{\cos(x+\delta) - \cos x}_{\text{cancellation}} = -2 \sin \frac{\delta}{2} \sin(x + \frac{\delta}{2})$

(c) $y = f(x+\delta) - f(x) = f'(x)\delta + \underbrace{f''(x)\frac{\delta^2}{2} + \dots}_{\text{disregard}}$

8) Evaluating polynomials. Nested form

Ex: Evaluate

$$f(x) = x^3 - 4.1x^2 + 1.7x + 3.5 \quad \text{at } x = 2.7$$

using 3-digit arithmetic