EXACT SOLUTION (ANALYTICAL SOLUTION) VERSUS APPROXIMATE SOLUTION (NUMERICAL SOLUTION)

EXACT SOLUTION

- Solution that can be presented in the form of a closed-form mathematical expression

APPROXIMATE SOLUTION

- Solution that cannot be expressed in the form of mathematical expression

$$y = 2x^2 + 3x + 5$$

Evaluate $\left.\dfrac{dy}{dx}\right|_{x=1}$.

JIM 101 Calculus,
Differentiation

x	0	1	2
$f(x)$	5	10	19

JIM 216/310 Introductory Numerical Methods,
Chapter 7 Numerical Differentiation

Formula 1
$$f'(x_0) \approx \frac{f(x_0 + h) - f(x_0)}{h}$$

Formula 2

$$f'(x_0) \approx \frac{f(x_0) - f(x_0 - h)}{h}$$

Formula 3
$$f'(x_0) \approx \frac{f(x_0 + h) - f(x_0 - h)}{2h}$$