4.1 - Calculating the derivative

Day 1 #1-30

① $\frac{dy}{dx} = 36x^2 - 16x + 7$

② $\frac{dy}{dx} = 24x^2 - 10x - \frac{1}{12}$

③ $\frac{dy}{dx} = 12x^3 - 18x^2 + \frac{1}{4}x$

④ $\frac{dy}{dx} = 20x^3 + 27x^2 + 24x - 7$

⑤ $F'(x) = 21x^{2.5} - \frac{5}{x^{.5}}$

⑥ $F'(x) = -3x^{-5} + \frac{6}{x^{.5}}$

⑦ $y = 8x^{\frac{1}{2}} + 6x^{\frac{3}{4}}$

$\frac{dy}{dx} = \frac{4}{\sqrt{x}} + \frac{18}{4\sqrt[4]{x}}$

⑧ $y = -100x^{\frac{1}{2}} - 11x^{2/3}$

$\frac{dy}{dx} = \frac{-50}{\sqrt{x}} - \frac{22}{3\sqrt[3]{x}}$

⑨ $g'(x) = \frac{-30}{x^6} + x^{\frac{1}{2}}$

⑩ $\frac{dy}{dx} = \frac{-30}{x^4} - \frac{20}{x^5} - 8$

⑪ $\frac{dy}{dx} = \frac{-25}{x^6} + \frac{12}{x^3} - \frac{13}{x^2}$

⑫ $F(t) = 7t^{-1} - 5t^{-3}$

$F'(t) = \frac{-7}{t^2} + \frac{15}{t^4}$

⑬ $F(t) = 14t^{-1} + 12t^{-4} + \sqrt{2}$

$F'(t) = \frac{-14}{t^2} - \frac{48}{t^5}$

⑭ $y = 6x^{-4} - 7x^{-3} + 3x^{-1} + \sqrt{5}$

$\frac{dy}{dx} = \frac{-24}{x^5} + \frac{21}{x^4} - \frac{3}{x^2}$

⑮ $y = 3x^{-6} + x^{-5} - 7x^{-2}$

$\frac{dy}{dx} = \frac{-18}{x^7} - \frac{5}{x^6} + \frac{14}{x^3}$

⑯ $p'(x) = \frac{5}{\sqrt{x^3}} - \frac{12}{\sqrt{x^5}}$

(17) $h'(x) = \frac{-1}{2}x^{-3/2} + 21x^{-5/2} = \boxed{\frac{-1}{2\sqrt{x^3}} + \frac{21}{\sqrt{x^5}}}$

(18) $y = 6x^{-1/4}$

$\frac{dy}{dx} = \frac{-6}{4}x^{-5/4} = \boxed{\frac{-3}{2\sqrt[4]{x^5}}}$

(19) $y = -2x^{-1/3}$

$\frac{dy}{dx} = \frac{2}{3}x^{-4/3} = \boxed{\frac{2}{3\sqrt[3]{x^4}}}$

(20) $F(x) = x^2 + 5x^{-1}$

$\boxed{F'(x) = 2x - \frac{5}{x^2}}$

(21) $g(x) = x^{5/2} - 4x^{1/2}$

$g'(x) = \frac{5}{2}x^{3/2} - 2x^{-1/2} = \boxed{\frac{5\sqrt{x^3}}{2} - \frac{2}{\sqrt{x}}}$

(22) $g(x) = (8x^2 - 4x)(8x^2 - 4x)$

$g(x) = 64x^4 - 64x^3 + 16x^2$

$\boxed{g'(x) = 256x^3 - 192x^2 + 32x}$

(23) $h(x) = (x^4 - 2x^2 + 1)(x^2 - 1) = x^6 + 2x^4 + x^2 - x^4 + 2x^2 + 1$

$h(x) = x^6 - 3x^4 + 3x^2 + 1$

$\boxed{h'(x) = 6x^5 - 12x^3 + 6x}$

(24) B. Linear

(25) $F'(a)$ = slope of tangent line @ $x = a$

(26) $\frac{d}{dx}(4x^3 - 6x^{-2}) = 12x^2 + \frac{12}{x^3}$

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(27) $D_x = \frac{-9}{2}x^{-3/2} - 3x^{-5/2} = \boxed{\frac{-9}{2\sqrt{x^3}} - \frac{3}{\sqrt{x^5}}}$

(28) $D_x\left(8x^{-\frac{1}{4}} - 3x^{-7/2}\right) = -2x^{-\frac{5}{4}} + \frac{9}{2}x^{-\frac{5}{2}} = \boxed{\frac{-2}{\sqrt[4]{x^5}} + \frac{9}{2\sqrt{x^5}}}$

(29) $F'(x) = \frac{2}{3}x^3 - 3$

$F'(-2) = \frac{2}{3}(-8) - 3 = -\frac{16}{3} - \frac{9}{3} = \boxed{\frac{-25}{3}}$

(30) $F'(x) = \frac{1}{3}x^2 - 14x$

$F'(3) = 3 - 52 = \boxed{-49}$