12-7-17 1st Trig

Derivative

Pick up on the pattern

① $f(x) = x^3 + 5x^2$

$f'(x) = 3x^2 + 10x$

② $f(x) = 6x^5 + 2x^3 + 8x^1$

$f'(x) = 30x^4 + 6x^2 + 8$

$x^0 = 1$

③ $f(x) = 10x^4 + 3x^3 + 5x^2 - x^1$

$f'(x) = 40x^3 + 9x^2 + 10x - 1$

④ $f(x) = 12$

$f'(x) = 0$

$12x^0$

$0 \cdot 12x^{-1}$

$0x^{-1}$

⑤ $f(x) = 20x^4 + 3x^2 + 6x + 10$

$f'(x) = 80x^3 + 6x + 6$

⑥ $f(x) = 10x^{-3} + 6x^{-5}$

$f'(x) = -30x^{-4} - 30x^{-6}$

$= \frac{-30}{x^4} - \frac{30}{x^6}$

⑦ $f(x) = 20x^{-6} - 8x^{-2}$

$-120x^{-7} + 16x^{-3}$

$\frac{-120}{x^7} + \frac{16}{x^3}$

⑧ $f(x) = \frac{6}{x^3}$

Rewrite as $f(x) = 6x^{-3}$

$f'(x) = -18x^{-4}$

$= \frac{-18}{x^4}$

⑨ $f(x) = \frac{2}{x^4}$

Rewrite $f(x) = 2x^{-4}$

$f'(x) = -8x^{-5}$

$= \frac{-8}{x^5}$

⑩ $f(x) = \frac{2}{3}x^3$

$f'(x) = \frac{3}{1} \cdot \frac{2}{3} x^2$

$2x^2$

⑪ $f(x) = \frac{3}{4}x^8$

$\frac{8}{1} \cdot \frac{3}{4} x^7$

$6x^7$

(12) $f(x) = \frac{x^4}{4}$ → OR $\frac{4}{4}x^3$

$\frac{1}{4} \cdot x^4$

$f'(x) = x^3$

(13) $f(x) = \frac{x^5}{2}$ $\times$ $\frac{1}{2}x^5$

$f'(x) = \frac{5x^4}{2}$

$\frac{5}{2}x^4$ $\frac{5}{2}x^4$

12-7-17 3rd Trig

Derivatives

① $f(x) = 8x^3 + 10x^2 + 6x$

$f'(x) = 24x^2 + 20x + 6$

② $f(x) = 4x^5 - 2x^3 + 6x^2$

$f'(x) = 20x^4 - 6x^2 + 12x$

③ $f(x) = 10x^3 - 6x^2$

$f'(x) = 30x^2 - 12x$

④ $f(x) = 5x^4 - 2x^2 + 10x^0$

$f'(x) = 20x^3 - 4x$

⑤ $f(x) = 10x^3 - 5x^2 + 6x + 8$

$f'(x) = 30x^2 - 10x + 6$

⑥ $f(x) = 6x^{-3} + 2x^{-2}$

$f'(x) = -18x^{-4} - 4x^{-3}$

$= \frac{-18}{x^4} - \frac{4}{x^3}$

(7) $f(x) = -4x^{-5} - 6x^{-2}$

$f'(x) = 20x^{-6} + 12x^{-3}$

$= \frac{20}{x^6} + \frac{12}{x^3}$

(8) $f(x) = \frac{2}{x^2} + \frac{8}{x^4}$

Rewrite as $2x^{-2} + 8x^{-4}$

$f'(x) = -4x^{-3} - 32x^{-5}$

$= \frac{-4}{x^3} - \frac{32}{x^5}$

(9) $f(x) = \frac{2}{x^3} - \frac{5}{x^2}$

$= 2x^{-3} - 5x^{-2}$

$f'(x) = -6x^{-4} + 10x^{-3}$

$= \frac{-6}{x^4} + \frac{10}{x^3}$

(10) $f(x) = \frac{1}{x^3} + \frac{2}{x^2} + 8$

$= x^{-3} + 2x^{-2} + 8$

$f'(x) = -3x^{-4} - 4x^{-3}$

$= \frac{-3}{x^4} - \frac{4}{x^3}$

(11) $f(x) = \frac{4}{x^2} + \frac{3}{x^3} + \frac{2}{x^{10}}$

$= 4x^{-2} + 3x^{-3} + 2x^{-10}$

$f'(x) = -8x^{-3} - 9x^{-4} - 20x^{-11}$

$= \frac{-8}{x^3} - \frac{9}{x^4} - \frac{20}{x^{11}}$

(12) $f(x) = \frac{2x^3}{3} \rightarrow \frac{2}{3} \cdot x^3$

$f'(x) = \frac{6x^2}{3}$ $= 2x^2$

$= 2x^2$

(13) $f(x) = \frac{5x^2}{6} = \frac{5}{6} \cdot \frac{2}{1} \cdot x$

$f'(x) = \frac{10x}{6}$ $\frac{5x}{3}$

$= \frac{5x}{3}$

12-7-17 4th Try

Derivatives

① $f(x) = 8x^3 + 2x^2 + 6x^1$

$f'(x) = 24x^2 + 4x + 6$

② $f(x) = 5x^6 + 6x^3$

$f'(x) = 30x^5 + 18x^2$

③ $f(x) = 10x^4 + 3x^2$

$f'(x) = 40x^3 + 6x$

④ $f(x) = 6x^5 - 2x^3 + 10x^0$

$f'(x) = 30x^4 - 6x^2$

⑤ $f(x) = 6x^{-4} + 2x^{-2}$

$f'(x) = -24x^{-5} - 4x^{-3}$

$= \frac{-24}{x^5} - \frac{4}{x^3}$

⑥ $f(x) = 2x^{-10} - 6x^{-3}$

$f'(x) = -20x^{-11} + 18x^{-4}$

$= \frac{-20}{x^{11}} + \frac{18}{x^4}$

(7) $f(x) = \frac{4}{x^3}$

Rewrite $f(x) = 4x^{-3}$

$f'(x) = -12x^{-4}$

$= \frac{-12}{x^4}$

(8) $f(x) = \frac{5}{x^3} + \frac{6}{x^2}$

$f(x) = 5x^{-3} + 6x^{-2}$

$f'(x) = -15x^{-4} - 12x^{-3}$

$= \frac{-15}{x^4} - \frac{12}{x^3}$

(9) $f(x) = \frac{-8}{x^8} - \frac{2}{x^6}$

$= -8x^{-8} - 2x^{-6}$

$f'(x) = 64x^{-9} + 12x^{-7}$

$\frac{64}{x^9} + \frac{12}{x^7}$

(10) $f(x) = \frac{x^8}{4}$ → $\frac{1}{4} \cdot x^8$

$f'(x) = \frac{8x^7}{4}$ $f'(x) = 8 \cdot \frac{1}{4} x^7$

$= 2x^7$ $= 2x^7$

(11) $f(x) = \frac{2x^2}{3} + \frac{3x}{5}$

$f'(x) = \frac{4x}{3} + \frac{3}{5}$

(12) $f(x) = \frac{2}{x^8}$

$= 2x^{-8}$

$f'(x) = -16x^{-9}$

$= \frac{-16}{x^9}$

(13) $f(x) = 18x$

$f'(x) = 18$