① $f(x) = (3x^4 + 2x)^5$

$f'(x) = 5(3x^4 + 2x)^4 (12x^3 + 2)$

$\boxed{f'(x) = 5(12x^3 + 2)(3x^4 + 2x)^4}$

② $f(x) = 4(2x^2 + 3x + 1)^3$

$f'(x) = 4 \cdot 3(2x^2 + 3x + 1)^2 (4x + 3)$

$\boxed{f'(x) = 12(4x+3)(2x^2 + 3x + 1)^2}$

④ $f(x) = \sqrt[3]{2x+3}$

$f(x) = (2x+3)^{1/3}$

$f'(x) = \frac{1}{3}(2x+3)^{-2/3} (2)$

$\boxed{f'(x) = \frac{2}{3}(2x+3)^{-2/3}}$

⑦ $f(x) = (9x+2)^{2/3}$

$f'(x) = \frac{2}{3}(9x+2)^{-1/3} (9)$

$f'(x) = \frac{18}{3}(9x+2)^{-1/3}$

$\boxed{f'(x) = 6(9x+2)^{-1/3}}$

⑨ $f(x) = 5(x^3 + 3x)^4$

$f'(x) = 20(x^3 + 3x)^3 (3x^2 + 3)$

$\boxed{f'(x) = 20(3x^2+3)(x^3 + 3x)^3}$

⑧ $f(x) = \sqrt[4]{2x^2 + 3}$

$f(x) = (2x^2 + 3)^{1/4}$

$f'(x) = \frac{1}{4}(2x^2 + 3)^{-3/4} (4x)$

$f'(x) = \frac{4x}{4}(2x^2 + 3)^{-3/4}$

$\boxed{f'(x) = x(2x^2 + 3)^{-3/4}}$