

- 1) $f(x) = 3x^5 + 2x^3 - 5x^2 + 3x + 1$
 $f'(x) = 15x^4 + 6x^2 - 10x + 3$
 $f''(x) = 2(30x^3 + 6x - 5)$
- 2) $f(x) = (2 - x)(x - 5)$
 $f'(x) = 7 - 2x$
 $f''(x) = -2$
- 3) $f(x) = (3x - 4)^7$
 $f'(x) = 21(4 - 3x)^6$
 $f''(x) = 378(3x - 4)^5$
- 4) $f(x) = 3(x - 2)^3 x^2$
 $f'(x) = 3(x - 2)^2 x(5x - 4)$
 $f''(x) = 12(5x^3 - 18x^2 + 18x - 4)$
- 5) $f(x) = \frac{5x - 3}{7x + 2}$
 $f'(x) = \frac{31}{(7x + 2)^2}$
 $f''(x) = -\frac{434}{(7x + 2)^3}$
- 6) $f(x) = \frac{5x^2 + 3x - 2}{3x^2 + 2x - 3}$
 $f'(x) = \frac{x^2 - 18x - 5}{(3x^2 + 2x - 3)^2}$
 $f''(x) = \frac{-6x^3 + 162x^2 + 90x + 74}{(3x^2 + 2x - 3)^3}$
- 7) $f(x) = \frac{(5x + 1)^3}{(2x - 1)^2}$
 $f'(x) = \frac{(5x + 1)^2(10x - 19)}{(2x - 1)^3}$
 $f''(x) = \frac{294(5x + 1)}{(1 - 2x)^4}$

$$8) f(x) = \sqrt{5x+2}$$

$$f'(x) = \frac{5}{2\sqrt{5x+2}}$$

$$f''(x) = -\frac{25}{4(5x+2)^{3/2}}$$

$$9) f(x) = \sqrt{\frac{3x+2}{4x-1}}$$

$$f'(x) = -\frac{11}{2(1-4x)^2 \sqrt{\frac{3x+2}{4x-1}}}$$

$$f''(x) = \frac{33(16x+7)}{4(1-4x)^4 \left(\frac{3x+2}{4x-1}\right)^{3/2}}$$

$$10) f(x) = \sqrt[3]{2x^3 - 5x^2 + 3x - 1}$$

$$f'(x) = \frac{6x^2 - 10x + 3}{3(2x^3 - 5x^2 + 3x - 1)^{2/3}}$$

$$f''(x) = -\frac{2(7x^2 + 3x - 6)}{9(2x^3 - 5x^2 + 3x - 1)^{5/3}}$$

$$11) f(x) = \sin(3x)$$

$$f'(x) = 3 \cos(3x)$$

$$f''(x) = -9 \sin(3x)$$

$$12) f(x) = \sin^3(x)$$

$$f'(x) = 3 \cos(x) \sin^2(x)$$

$$f''(x) = -\frac{3}{4} (\sin(x) - 3 \sin(3x))$$

$$13) f(x) = \sin^3(3x)$$

$$f'(x) = 9 \cos(3x) \sin^2(3x)$$

$$f''(x) = -\frac{27}{4} (\sin(3x) - 3 \sin(9x))$$

$$14) \quad f(x) = \sqrt{\cos^3(5x)}$$

$$f'(x) = -\frac{15}{2} \sqrt{\cos^3(5x)} \tan(5x)$$

$$f''(x) = -\frac{75 \cos(5x) (3 \cos(10x) + 1)}{8 \sqrt{\cos^3(5x)}}$$

$$15) \quad f(x) = \sqrt[4]{\tan^3(3x)}$$

$$f'(x) = \frac{9}{2} \csc(6x) \sqrt[4]{\tan^3(3x)}$$

$$f''(x) = -\frac{27 (4 \cos(6x) - 3) \sec^4(3x) \tan(3x)}{16 \tan^3(3x)^{3/4}}$$

$$16) \quad f(x) = \cos(2x) \sin^2(3x)$$

$$f'(x) = 2 (\cos(x) + 2 \cos(5x)) \sin(3x)$$

$$f''(x) = 4 (\cos(4x) + 4 \cos(8x)) - 2 \cos(2x)$$

$$17) \quad f(x) = \frac{\sin(x)}{\sqrt{\cos(x)}}$$

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

$$f''(x) = -\frac{\sin(3x) - 11 \sin(x)}{16 \cos^{5/2}(x)}$$

$$18) \quad f(x) = \frac{1}{\sqrt{\sin(x) - \sin^2(x)}}$$

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

$$f''(x) = \frac{8 \cos^2(x) - 8 \cot(x) \cos(x) + 3 \cot^2(x) + 4 \sin^2(x) - 6 \sin(x) + 2}{4 (\sin(x) - 1)^2 \sqrt{-\sin(x) - 1} \sin(x)}$$