

第三章 导数与微分

1.(1) A; (2) B; (3) C; (4) D; (5) C; (6) B;
(7) D; (8) C; (9) A; (10) C.

2.(1) $f'(x_0)$; (2) 0; (3) 1; (8) $y = 2x$; (5) $2x\cos x - x^2\sin x$;

(6) $\frac{1-\ln x}{2x^2}$; (7) $e^x(2+x)$; (8) $\frac{1+2x^2}{\sqrt{1+x^2}}$;

(9) $\frac{1}{x\ln 5} + 5^x \ln 5$; (10) $e^x(\sin x + \cos x)$; (11) $2^n e^{2x}$;

(12) $3x^2 \cos x^3$; (13) $e^x \cot e^x$; (14) $\frac{1}{x^2} e^{\cos \frac{1}{x}} \sin \frac{1}{x}$;

(15) $\frac{x}{\sqrt{(1-x^2)^3}}$; (16) $\frac{-2x\sin 2x - \cos 2x}{x^2}$; (17) $-\frac{2\arccos x}{\sqrt{1-x^2}}$;

(18) $\frac{\sqrt{2}}{2e}$; (19) $\frac{e^x - 2x\sin(x^2+y^2) - 2xy}{x^2 + 2y\sin(x^2+y^2)}$; (20) $y = -x$;

(21) $x^{\sin x}(\cos x \cdot \ln x + \frac{\sin x}{x})$; (22) 6, 0; (23) $\frac{15\sqrt{x}}{4}$;

(24) $2e^{x^2} + 4x^2e^{x^2}$; (25) $2\cos x - x\sin x$; (26) $\frac{1}{x}$;

(27) $\frac{1}{\sqrt{(x^2+1)^3}} dx$; (28) $\frac{2\ln(1-x)}{x-1} dx$; (29) $(-x^{\cos x} \sin x \ln x + x^{\cos x-1} \cos x) dx$;

(30) -1; (31) $-\frac{4t}{\sin t}$; (32) $3x^2 - \cos x$, $6 + \cos x$;

(33) 2.

3.(1) 错误; (2) 正确; (3) 错误; (12) 错误; (5) 错误; (6) 正确;
(7) 错误; (8) 错误; (9) 正确; (10) 正确; (11) 正确; (12) 错误.

4.切线方程: $y - x\ln 2 - 1 = 0$, 法线方程: $y\ln 2 + x - \ln 2 = 0$.

5.切线方程 $y = 1$.

6.(1) -A; (2) 2A.

7.(1) $4x + \frac{2}{x^3} + 2$; (2) $2x\cos x - x^2\sin x$; (3) $-\frac{1}{2\sqrt{x^3}} + \frac{1}{4\sqrt{x}}$;

$$(4) -\frac{1+\cos x}{(x+\sin x)^2}; \quad (5) 3x^2 + \frac{1}{x^2} - \frac{3}{x^4} - 1; \quad (6) 0;$$

$$(7) \frac{2\tan x - x^2 \tan x + 2x \sec^2 x + x^3 \sec^2 x}{(2+x^2)^2}; \quad (8) \frac{2^x \ln 4}{(2^x + 1)^2};$$

$$(9) e^x (-\cos x - 3\sin x); \quad (10) -\frac{5}{(2x-1)^2};$$

$$(11) 2\sec x \tan x + \frac{\arctan x}{\sqrt{x}} + \frac{2\sqrt{x}}{1+x^2}; \quad (12) \cos 2x.$$

$$8.(1) -2\sin 2x; \quad (2) -2e^{-2x}; \quad (3) -\frac{\sin^2 x}{x^2} + \frac{\sin 2x}{x};$$

$$(4) 3(2\cos x + x)^2(1-2\sin x); \quad (5) -\frac{1}{1-2x};$$

$$(6) 3(\sqrt{x} - x)^2\left(\frac{1}{2\sqrt{x}} - 1\right); \quad (7) \frac{1}{2\sqrt{x}(1+x)}; \quad (8) 2^{\tan^2 x} 2\ln 2 \cdot \tan x \sec^2 x$$

$$(9) \frac{4(4 + \log_4 x)^3}{x \ln 4}; \quad (10) e^{\cos x} - xe^{\cos x} \sin x; \quad (11) 9x^2(x^3 - 1)^2;$$

$$(12) \frac{2\sqrt{x} + 1}{4\sqrt{x^2 + x\sqrt{x}}}; \quad (13) \frac{1}{x \ln x \cdot \ln(\ln x)}; \quad (14) 2\cos 2x;$$

$$(15) \frac{\sin 2\sqrt{1-2x}}{\sqrt{1-2x}}; \quad (16) \frac{2^{\sqrt{x}} \ln 2}{2\sqrt{x}}; \quad (17) -\frac{2\arcsin \frac{1}{x}}{x\sqrt{x^2-1}};$$

$$(18) -2x; \quad (19) \frac{x}{(2+\sqrt{x^2-2})\sqrt{x^2-2}}; \quad (20) \frac{1}{2}\sin 4x;$$

$$9.(1) \frac{1}{1+t}; \quad (2) \frac{(1+t^2)(\sqrt{1-t^2}-1)}{2t\sqrt{1-t^2}};$$

$$10.(1) -\frac{2x}{\sqrt{(x^2+1)^3}} dx; \quad (2) -e^{-x}[\sin(\beta-x) + \cos(\beta-x)]dx;$$

$$(3) 2\sec^2 2x \cdot e^{-\tan 2x} dx \quad (4) \left(-\frac{1}{x^2} 2^{\sin \frac{1}{x}} \ln 2 \cdot \cos \frac{1}{x}\right) dx; \quad (5) (3x^2 - 3\sin 3x) dx;$$

$$(6) e^x (\cos x - \sin x) dx ;$$

$$(7) -\frac{2e^{2x}}{\sqrt{1-e^{4x}}} dx ;$$

$$(8) 2e^{2x} (\sin 2x + \cos 2x) dx.$$