

23 (1) $(-\infty, -1) \cup (-1, \infty)$

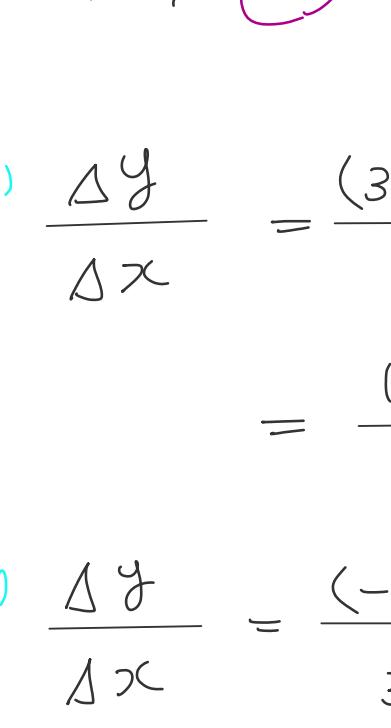
(2) $x^2 + 1 \neq 0$

$x^2 \neq -1$

$x \neq \pm i$

$(-\infty, \infty)$

(3) $y = \sqrt{x}$ to x 轴 - 3, y 轴对称移动



[-3, 0]

(4) $y = \log_2 x$ to x 轴 + 4

(-\infty, 0)

(5) $x - 2 \geq 0 \wedge \sqrt{x-2} \neq 0$

$x > 2$

(2, 0)

24 (1) $\frac{\Delta y}{\Delta x} = \frac{(3 \cdot 4 + 5) - (3 \cdot 1 + 5)}{4 - 1}$

$= \frac{17 - 8}{3} = 3$

(2) $\frac{\Delta y}{\Delta x} = \frac{(-3^2 + 1) - (-(-1)^2 + 1)}{3 - (-1)}$

$= \frac{-8 - 0}{4} = -2$

(3) $\frac{\Delta y}{\Delta x} = \frac{b^2 - a^2}{b - a} = b + a$

(4) $\frac{\Delta y}{\Delta x} = \frac{(a+h)^3 - a^3}{(a+h) - a}$

$= \frac{3a^2h + 3ah^2 + h^3}{h}$

$= 3a^2 + 3ah + h^2$

25 (1) $f'(3) = \lim_{h \rightarrow 0} \frac{f(3+h) - f(3)}{h}$

$= \lim_{h \rightarrow 0} \frac{\{(3+h)^2 - 2(3+h)\} - \{3^2 - 2 \cdot 3\}}{h}$

$= \lim_{h \rightarrow 0} \frac{9 + 6h + h^2 - 6 - 2h - 9 - 6}{h}$

$= \lim_{h \rightarrow 0} \frac{h^2 + 4h}{h} = \lim_{h \rightarrow 0} (h + 4)$

$= 0 + 4 = 4$

(2) $f'(-1) = \lim_{h \rightarrow 0} \frac{f(-1+h) - f(-1)}{h}$

$= \lim_{h \rightarrow 0} \frac{\{(-1+h)^2 - 2(-1+h)\} - \{(-1)^2 - 2(-1)\}}{h}$

$= \lim_{h \rightarrow 0} \frac{1 - 2h + h^2 + 2 - 2h - 1 - 2}{h}$

$= \lim_{h \rightarrow 0} (h - 4)$

$= 0 - 4 = -4$

(3) $f'(a) = \lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h}$

$= \lim_{h \rightarrow 0} \frac{\{(a+h)^2 - 2(a+h)\} - \{a^2 - 2a\}}{h}$

$= \lim_{h \rightarrow 0} \frac{a^2 + 2ah + h^2 - 2a - 2h - a^2 + 2a}{h}$

$= \lim_{h \rightarrow 0} (h + 2a - 2)$

$= 2a - 2$

26 (1) $y' = \lim_{h \rightarrow 0} \frac{\{5(x+h) + 1\} - \{5x + 1\}}{h}$

$= \lim_{h \rightarrow 0} 5h/h$

$= 5$

(2) $y' = \lim_{h \rightarrow 0} \frac{2(x+h)^2 - 2x^2}{h}$

$= \lim_{h \rightarrow 0} \frac{2x^2 + 4xh + 2h^2 - 2x^2}{h}$

$= 4x$

(3) $y' = \lim_{h \rightarrow 0} \frac{-(x+h)^3 - (-x^3)}{h}$

$= \lim_{h \rightarrow 0} \frac{-\{x^3 + 3x^2h + 3xh^2 + h^3\} + x^3}{h}$

$= \lim_{h \rightarrow 0} (-3x^2 - 3xh + h^2)$

$= -3x^2$

27 (1) $y' = (7x)' + (3)'$

$= 7$

(2) $y' = (2x^2)' - (5x)' + (6)'$

$= 2 \cdot 3x^2 - 5$

$= 6x^2 - 5$

(3) $y' = \left(\frac{3}{2}x^5\right)' - \left(\frac{x}{2}\right)'$

$= \frac{3}{2} \cdot 5x^4 - \frac{1}{2}$

$= \frac{15}{2}x^4 - \frac{1}{2}$

$= \frac{15}{2}x^4 - \frac{1}{2}$

(4) $y' = \left(\frac{5}{3}x^3\right)' - \left(\frac{x^2}{3}\right)'$

$= \frac{5}{3} \cdot 3x^2 - \frac{1}{3} \cdot 2x$

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

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

28 (1) $\frac{dV}{dr} = \frac{4}{3}\pi (r^3)'$

$= \frac{4}{3}\pi \cdot 3r^2$

$= 4\pi r^2$

(2) $\frac{dp}{dr} = -(p^3)' + (2p)' - (5)'$

$= -3p^2 + 2$

(3) $\frac{dx}{dr} = (7x^2)' - (2x)' + (3)'$

$= 7 \cdot 2x - 2$

$= 14x - 2$

29 (1) $f'(x) = (2x)' - (7)'$

$= 2$

$f'(3) = 2$

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

$\frac{f'(3+h)}{f'(3)} = \frac{1}{2}$

$= \lim_{h \rightarrow 0} \frac{\{2(x+h)\} - \{2x\}}{h}$

$= \lim_{h \rightarrow 0} \frac{\{2x + 2h\} - \{2x\}}{h}$

$= \lim_{h \rightarrow 0} (2 + 2)$

$= 2$

$= 2$

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

$= \frac{2}{3}x^2 - \frac{1}{2}$