

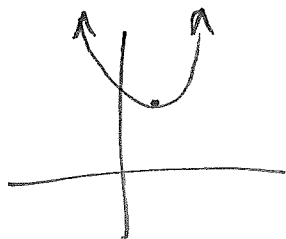
① $f(x) = 3x + 7$
 $f(x+h) = 3(x+h) + 7 = 3x + 3h + 7$

$$\frac{f(x+h) - f(x)}{h} = \frac{3x + 3h + 7 - 3x - 7}{h} = \frac{3h}{h} = \boxed{3}$$

② $f(x) = x - x^2$
 $f(x+h) = x+h - (x+h)^2 = x+h - x^2 - 2xh - h^2$

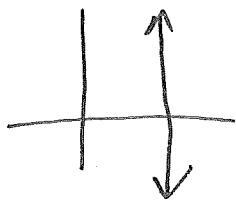
$$\frac{f(x+h) - f(x)}{h} = \frac{x+h - x^2 - 2xh - h^2 - x + x^2}{h} = \boxed{1 - 2x - h}$$

③ function.
not 1 to 1



④ • not a function
• is 1 to 1

⑤ • not function
• 1 to 1.



⑥ • not function $x=2 \rightarrow \begin{cases} y=9 \\ \text{or} \\ y=8 \end{cases}$
• not 1 to 1

⑦ • not function
• not 1 to 1.

⑧ $(2, -5)$ maximum.

⑨ $(5, 2)$ minimum.

⑩ $(4, 14)$ maximum

$$x_v = \frac{-b}{2a} = \frac{-8}{2(-1)} = 4$$

$$y_v = -4^2 + 8(4) - 2 = -16 + 32 - 2 = 14$$

⑪ $(-4, 4)$ maximum.

$$x_v = \frac{-2 - 6}{2} = \frac{-8}{2} = -4$$

$$y_v = -(-4+2)(-4+6) = -(-2)(2) = 4$$

$$(12) \quad y = x^2 + 4x - 5$$

$$x_v = \frac{-4}{2 \cdot 1} = -2$$

$$y = (x+2)^2 - 9$$

$$y_v = (-2)^2 + 4(-2) - 5$$

$$4 - 8 - 5$$

$$-9$$

$$(13) \quad y = -3x^2 + 6x - 1$$

$$x_v = \frac{-6}{2(-3)} = 1$$

$$y = -3(x-1) + 2$$

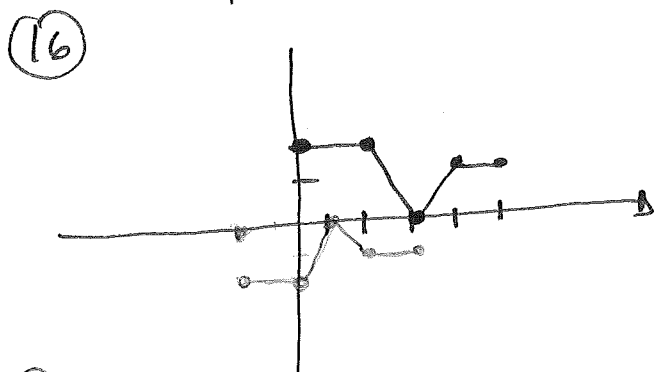
$$y_v = -3 \cdot 1^2 + 6 \cdot 1 - 1$$

$$= -3 + 6 - 1$$

$$= 2$$

(14) 2 units right
6 units up
reflected across x-axis

(15) 7 units left
3 units down
stretched by a factor of 2



| (x, y) | $-f(x+2)$ $(x-2, -y)$ |
|----------|--------------------------|
| (0, 2) | (-2, -2) |
| (2, 2) | (0, -2) |
| (3, 0) | (1, 0) |
| (4, 1) | (2, -1) |
| (5, 1) | (3, -1) |

(17) $y = 3x + 5$
 $x = 3y + 5$
 $x - 5 = 3y$

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

$$f^{-1}(x) = \frac{x-5}{3}$$

(18) $f^{-1}(x) = \{ (4, 1), (7, 3), (-9, 2), (6, -1) \}$

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

$$y = \pm \sqrt{\frac{x+1}{2}}$$