

$$x: 0 \rightarrow \frac{3}{2}$$

$$\frac{3}{2} \rightarrow 3$$

$$f(x): 0 \rightarrow 3$$

$$3 \rightarrow 0$$

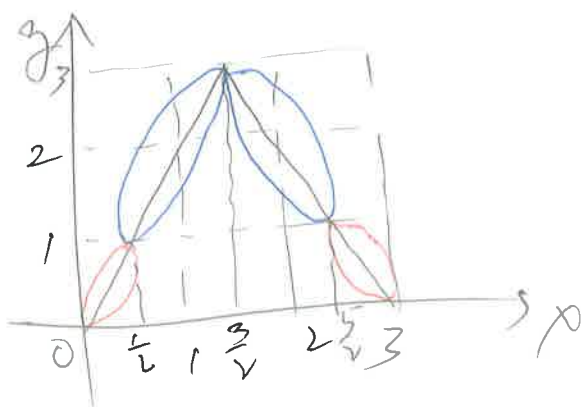
$$g(x): 0 \rightarrow 2 \rightarrow 3$$

$$3 \rightarrow 2 \rightarrow 0$$

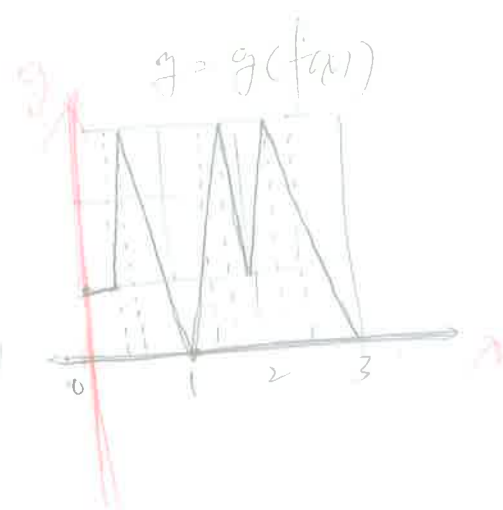
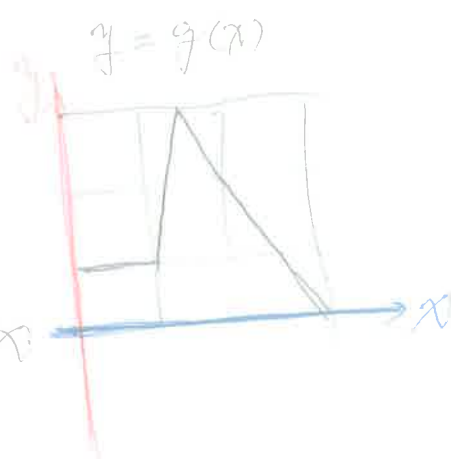
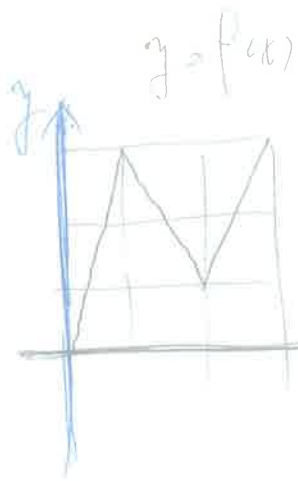
$$f(x) = \begin{cases} 2x & (0 \leq x \leq \frac{3}{2}) \\ -2x + 6 & (\frac{3}{2} \leq x \leq 3) \end{cases}$$

$$g(x) = \begin{cases} 2x & (0 \leq x \leq 1) \\ \frac{1}{2}x + \frac{3}{2} & (1 \leq x \leq 3) \end{cases}$$

$$g(f(x)) = \begin{cases} 2f(x) & (0 \leq f(x) \leq 1) \\ \frac{1}{2}f(x) + \frac{3}{2} & (1 \leq f(x) \leq 3) \end{cases} \begin{cases} 2 \cdot (2x) & (0 \leq x < \frac{1}{2}) \\ 2(-2x + 6) & (\frac{1}{2} \leq x \leq \frac{3}{2}) \\ \frac{1}{2}(2x) + \frac{3}{2} & (\frac{1}{2} \leq x \leq \frac{3}{2}) \\ \frac{1}{2}(-2x + 6) + \frac{3}{2} & (\frac{3}{2} \leq x < \frac{5}{2}) \end{cases}$$



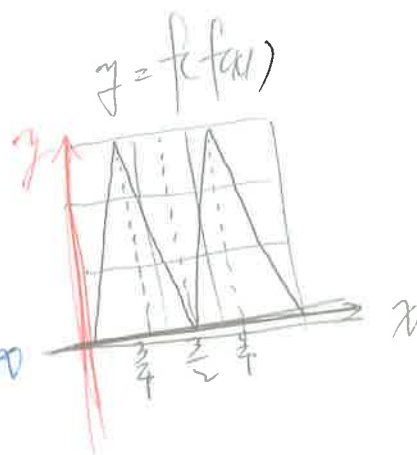
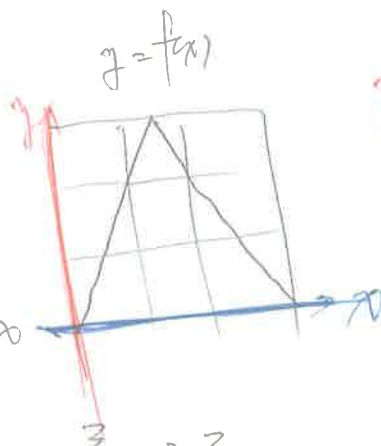
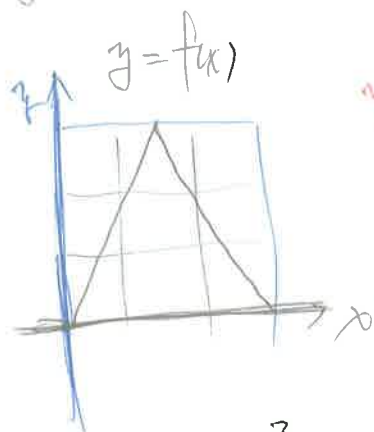
$$\therefore g(f(x)) = \begin{cases} 4x & (0 \leq x < \frac{1}{2}) \\ x + \frac{3}{2} & (\frac{1}{2} \leq x < \frac{3}{2}) \\ -x + \frac{9}{2} & (\frac{3}{2} \leq x < \frac{5}{2}) \\ -4x + 12 & (\frac{5}{2} \leq x \leq 3) \end{cases}$$



$$x: 0 \rightarrow 1 \quad 1 \rightarrow 2 \quad 2 \rightarrow 3$$

$$f(x): 0 \rightarrow 3 \quad 3 \rightarrow 1 \quad 1 \rightarrow 3$$

$$g(x): 0 \rightarrow 1 \rightarrow 3 \rightarrow 0 \quad 0 \rightarrow 3 \rightarrow 1 \quad 1 \rightarrow 3 \rightarrow 0$$



$$\frac{3}{2}$$

$$x: 0 \rightarrow \frac{3}{2}$$

$$\frac{3}{2} \rightarrow 3$$

$$f(x): 0 \rightarrow 3$$

$$3 \rightarrow 0$$

$$f(x): 0 \rightarrow 3 \rightarrow 0$$

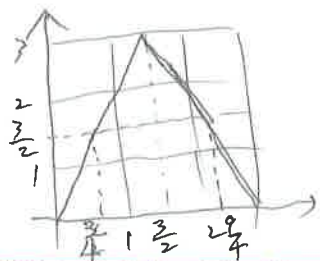
$$0 \rightarrow 3 \rightarrow 0$$

$$f(x) = \begin{cases} 2x & (0 \leq x < \frac{3}{2}) \\ -2x + 6 & (\frac{3}{2} \leq x \leq 3) \end{cases}$$

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$$f(f(x)) = \begin{cases} 2f(x) & (0 \leq f(x) < \frac{3}{2}) \\ -2f(x) + 6 & (\frac{3}{2} \leq f(x) \leq 3) \end{cases}$$

$$\begin{cases} 2(2x) & (0 \leq x < \frac{3}{4}) \\ 2(-2x + 6) & (\frac{3}{4} \leq x < \frac{3}{2}) \\ -2(2x) + 6 & (\frac{3}{2} \leq x < \frac{9}{4}) \\ -2(-2x + 6) + 6 & (\frac{9}{4} \leq x \leq 3) \end{cases}$$



$$f(f(x)) = \begin{cases} 4x & (0 \leq x < \frac{3}{4}) \\ -4x + 12 & (\frac{3}{4} \leq x < \frac{3}{2}) \\ 4x - 12 & (\frac{3}{2} \leq x < \frac{9}{4}) \\ -4x + 12 & (\frac{9}{4} \leq x \leq 3) \end{cases}$$

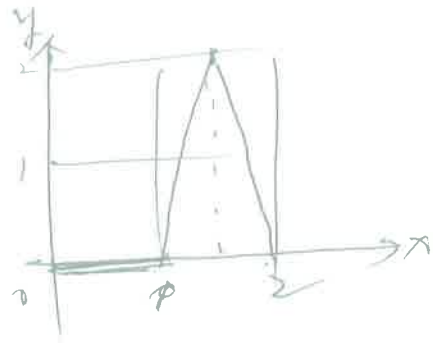
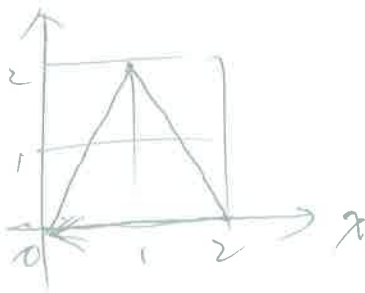
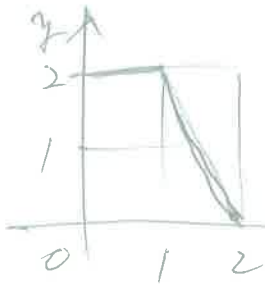
$$-\frac{11}{2} + \frac{14}{2}$$

$$-2x \times \frac{9}{4} + 6 = -\frac{9}{2} + \frac{12}{2} = \frac{3}{2}$$

$$y = f(x)$$

$$y = g(x)$$

$$y = g(f(x))$$



$$x: 0 \rightarrow 1$$

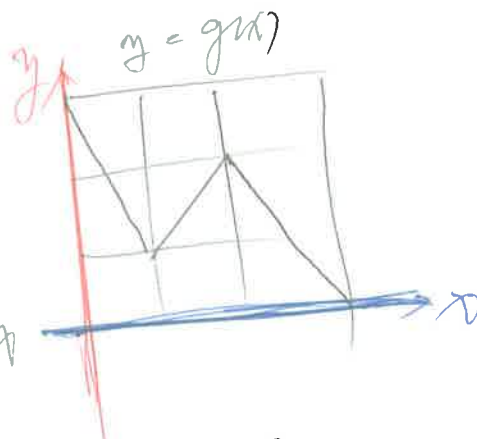
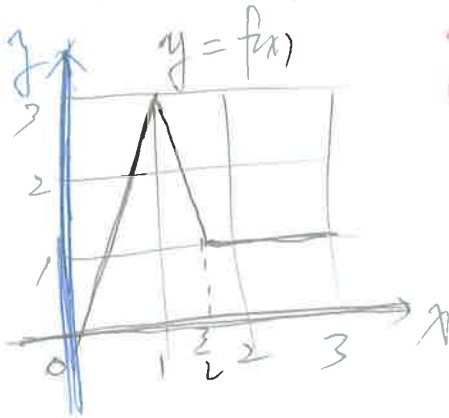
$$x: 1 \rightarrow 2$$

$$f(x): 2 \rightarrow 2$$

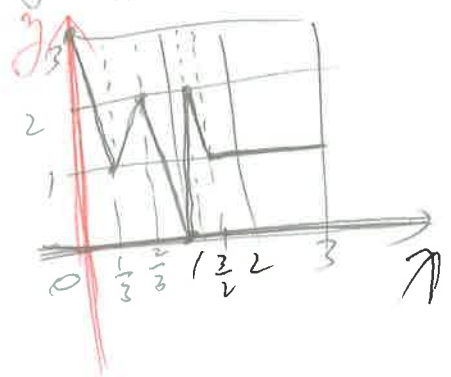
$$f(x): 2 \rightarrow 0$$

$$g(x): 0 \rightarrow 2$$

$$g(x): 0 \rightarrow 2 \rightarrow 0$$



$$y = g(f(x))$$



$$x: 0 \rightarrow 1$$

$$1 \rightarrow \frac{3}{2}$$

$$\frac{3}{2} \rightarrow 3$$

$$f(x): 0 \rightarrow 3$$

$$3 \rightarrow 1$$

$$1 \rightarrow 2$$

$$g(x): 3 \rightarrow 1 \rightarrow 2 \rightarrow 0$$

$$0 \rightarrow 2 \rightarrow 1$$

$$1 \rightarrow 2$$