

① a) $\lim_{x \rightarrow 0} \frac{\cancel{(x+2)}^2 - \frac{1}{\cancel{(x+2)}}}{x(x+2)}$ CD: $(x+2)$

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

$$\lim_{x \rightarrow 0} \frac{\cancel{-x}}{\cancel{x}(x+2)} = \boxed{\frac{-1}{2}}$$

c) $\lim_{x \rightarrow 1} \frac{(x+2)^3 - 27}{x-1}$

$$\lim_{x \rightarrow 1} \frac{\cancel{(x+2)}^{x-1} - 3}{\cancel{x-1}} \left[\cancel{(x+2)}^2 + 3\cancel{(x+2)} + 9 \right] = 9 + 9 + 9 = \boxed{27}$$

OR

c) $\lim_{x \rightarrow 1} \frac{(x+2)^3 - 27}{(x-1)}$

Expand $(x+2)^3$

$$\lim_{x \rightarrow 1} \frac{x^3 + 6x^2 + 12x + 8 - 27}{(x-1)}$$

Synthetic Sub.

$$\lim_{x \rightarrow 1} \frac{x^3 + 6x^2 + 12x - 19}{(x-1)} \quad \begin{array}{r|rrrr} 1 & 1 & 6 & 12 & -19 \\ & & 1 & 7 & \\ \hline & 1 & 7 & 19 & \end{array}$$

$$\lim_{x \rightarrow 1} \frac{\cancel{(x-1)}(\cancel{x}^2 + 7x + 19)}{\cancel{(x-1)}} = 1 + 7 + 19 = \boxed{27}$$

$$\textcircled{1} \text{ d) } \lim_{x \rightarrow 7} \frac{(\sqrt{x+9} - 4)(\sqrt{x+9} + 4)}{(x-7)(\sqrt{x+9} + 4)}$$

$$\lim_{x \rightarrow 7} \frac{x+9-16}{(x-7)(\sqrt{x+9} + 4)}$$

$$\lim_{x \rightarrow 7} \frac{\cancel{x-7}}{(\cancel{x-7})(\sqrt{x+9} + 4)} = \boxed{\frac{1}{8}}$$

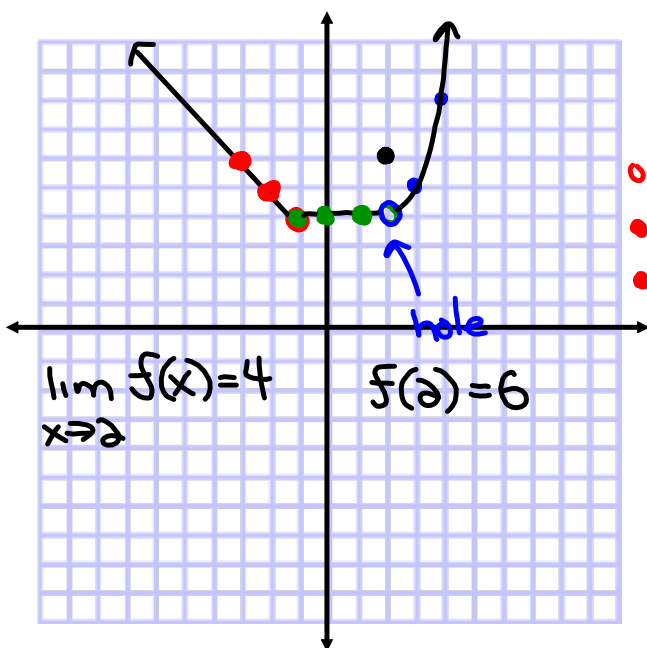
$$\text{a) } \lim_{x \rightarrow 0} \frac{\cancel{(x+2)} \cdot 2 - \frac{1}{1}(x+2)}{x(x+2)}$$

CD: $(x+2)$

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

$$\lim_{x \rightarrow 0} \frac{\cancel{-x}}{\cancel{-x}(x+2)} = \boxed{\frac{-1}{2}}$$

$$\textcircled{2} \quad f(x) = \begin{cases} 3-x, & x < -1 \\ 4, & -1 \leq x < 2 \\ 6, & x = 2 \\ (x-2)^2 + 4, & x > 2 \end{cases}$$



$3-x$	
x	y
-1	4
-2	5
-3	6

4	
x	y
-1	4
0	4
1	4
2	4

6	
x	y
2	6

$(x-2)^2 + 4$	
x	y
2	4
3	5
4	8

Discontinuous @
 $x = 2$

$$\lim_{x \rightarrow 2} f(x) \neq f(2)$$