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(24)

$$f(x) = x + 7 \quad g(x) = x^2$$

a) $\lim_{x \rightarrow 3} f(x)$

$$x \rightarrow 3$$

$$-3 + 7 = 4$$

b) $\lim_{x \rightarrow 4} g(x)$

$$x \rightarrow 4$$

$$4^2 = 16$$

c) $\lim_{x \rightarrow -3} g(f(x))$

$$x \rightarrow -3$$

$$\frac{(x+7)^2}{(-3+7)^2}$$

$$16$$

(38)

$$\lim_{x \rightarrow 7} f(x) = 3/2$$

$$x \rightarrow 7$$

$$\lim_{x \rightarrow 7} g(x) = 1/2$$

$$x \rightarrow 7$$

a) $\lim_{x \rightarrow 7} 4f(x)$

$$x \rightarrow 7$$

$$4(3/2) = 12/2 = 6$$

b) $\lim_{x \rightarrow 7} [f(x) + g(x)]$

$$x \rightarrow 7$$

$$3/2 + 1/2 = 2$$

c) $\lim_{x \rightarrow 7} [f(x)g(x)]$

$$x \rightarrow 7$$

$$3/2 \cdot 1/2 = 3/4$$

d) $\lim_{x \rightarrow 7} \frac{f(x)}{g(x)}$

$$x \rightarrow 7$$

$$\frac{3}{2} \div \frac{1}{2} = \frac{3}{2} \cdot \frac{2}{1} = 3$$

$$= 3$$

(16)

$$\lim_{x \rightarrow 3} \frac{\sqrt{x+1} - 2}{x-3} \quad \left(\frac{\sqrt{x+1} + 2}{\sqrt{x+1} + 2} \right)$$

$$x \rightarrow 3$$

$$x-3$$

$$\frac{\sqrt{x+1} + 2}{\sqrt{x+1} + 2}$$

$$\lim_{x \rightarrow 3} \frac{x+1-4}{x-3(\sqrt{x+1}+2)}$$

$$x \rightarrow 3 \quad x-3(\sqrt{x+1}+2)$$

$$\lim_{x \rightarrow 3} \frac{x-3}{x-3(\sqrt{x+1}+2)}$$

$$x \rightarrow 3 \quad x-3(\sqrt{x+1}+2)$$

$$\lim_{x \rightarrow 3} \frac{1}{\sqrt{x+1}+2} = \frac{1}{\sqrt{4}+2} = \frac{1}{4}$$

(62)

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

$$\Delta x \rightarrow 0$$

$$\Delta x$$

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

$$\Delta x \rightarrow 0$$

$$\Delta x$$

$$\lim_{\Delta x \rightarrow 0} \frac{x^2 + 2x\Delta x + \Delta x^2 - x^2}{\Delta x}$$

$$\Delta x \rightarrow 0$$

$$\Delta x$$

$$\lim_{\Delta x \rightarrow 0} \frac{2x\Delta x + \Delta x^2}{\Delta x}$$

$$\Delta x \rightarrow 0$$

$$\Delta x$$

$$\lim_{\Delta x \rightarrow 0} \frac{2x + \Delta x}{1}$$

$$\Delta x \rightarrow 0$$

$$= 2x$$

$$\begin{aligned}
 \textcircled{b} \lim_{x \rightarrow 0} \frac{\frac{1}{x+4} - \frac{1}{4}}{x} &\rightarrow \frac{\frac{1}{x+4} - \frac{1}{4}}{x} = \frac{\frac{4 - (x+4)}{4(x+4)}}{x} \\
 \lim_{x \rightarrow 0} \frac{-x}{4(x+4)} &= \frac{x}{1} \\
 \lim_{x \rightarrow 0} \frac{-x}{4(x+4)} &= \frac{1}{x} \\
 \lim_{x \rightarrow 0} \frac{-1}{4(x+4)} &= \frac{-1}{4(4)} = -\frac{1}{16}
 \end{aligned}$$

Write $\lim_{\Delta x \rightarrow 0} \frac{f(x+\Delta x) - f(x)}{\Delta x}$

$$\begin{aligned}
 \text{a) } f(x) &= 4x+2 \\
 \lim_{\Delta x \rightarrow 0} \frac{4(x+\Delta x)+2 - (4x+2)}{\Delta x} \\
 \lim_{\Delta x \rightarrow 0} \frac{4x+4\Delta x+2-4x-2}{\Delta x} \\
 \lim_{\Delta x \rightarrow 0} \frac{4\Delta x}{\Delta x} &= 4
 \end{aligned}$$

$$\begin{aligned}
 \text{b) } f(x) &= \frac{1}{x} \\
 \lim_{\Delta x \rightarrow 0} \frac{\frac{1}{x+\Delta x} - \frac{1}{x}}{\Delta x}
 \end{aligned}$$

$$\begin{aligned}
 \text{c) } f(x) &= x^2+3x \\
 \lim_{\Delta x \rightarrow 0} \frac{(x+\Delta x)^2+3(x+\Delta x) - (x^2+3x)}{\Delta x}
 \end{aligned}$$