Ch. 1.2-1.3 Evaluating Limits Algebraically Practice Worksheet

1)

$$\lim_{x\to 4}\frac{\sqrt{x}-2}{x-4}$$

2)

$$\lim_{x\to 2}\frac{x^2-6x+8}{x-2}$$

3)

$$\lim_{x\to 0}\frac{\frac{1}{-2+x}+\frac{1}{2}}{x}$$

4)

$$\lim_{x\to 3}\frac{3x^2-8x-3}{x-3}$$

5)

$$\lim_{x\to 2}\frac{\frac{2}{x^2}-\frac{1}{2}}{x-2}$$

6)

$$\lim_{x\to 3}\frac{\sqrt{x-2}-1}{x-3}$$

7)

$$\lim_{x\to 6}\frac{3x^2-17x-6}{36-x^2}$$

8)

$$\lim_{x\to 0}\frac{\frac{1}{1+x}-1}{x}$$

9)

$$\lim_{x\to 1}\frac{\sqrt{x+8}-3}{x-1}$$

10)

$$\lim_{x\to 1}\frac{2x^2-x-3}{x-1}$$

11)

$$\lim_{x\to 3}\frac{4x^2-7x-2}{x-2}$$

12)

$$\lim_{x\to 1}\frac{3x^2-4x+1}{2x^2-x-3}$$

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Key

1) $\lim_{x\to 4} \frac{\sqrt{x}-2}{x-4}$ ← $\frac{0}{0}$

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

$\lim_{x\to 4} \frac{(x-4)\,1}{(x-4)(\sqrt{x}+2)}$

$\lim_{x\to 4} \frac{1}{\sqrt{x}+2} = \frac{1}{\sqrt{4}+2} = \frac{1}{2+2} = \boxed{\frac{1}{4}}$

2) $\lim_{x\to 2} \frac{x^2-6x+8}{x-2}$ ← $\frac{4-12+8}{2-2} = \frac{0}{0}$

$-4 \quad 8 \quad -2$

$1 \quad -6 \quad 1$

$\lim_{x\to 2} \frac{(x-4)(x-2)}{(x-2)}$

$2-4 = \boxed{-2}$

3) $\lim_{x\to 0} \frac{\left(\frac{1}{-2+x} + \frac{1}{2}\right)}{x}$ ← $\frac{0}{0}$

$\cdot 2(x-2)$

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

$\lim_{x\to 0} \frac{x}{x\cdot 2(x-2)} = \lim_{x\to 0} \frac{1}{2(x-2)} = \frac{1}{2(-2)}$

$= \boxed{-1/4}$

4) $\lim_{x\to 3} \frac{3x^2-8x-3}{x-3}$ → $\frac{0}{0}$

a·c

$-9 \quad -9 \quad 1$

$3 \quad -8 \quad 3$

$\lim_{x\to 3} \frac{(x-3)(3x+1)}{(x-3)} = \boxed{10}$

5) $\lim_{x\to 2} \frac{\frac{2}{x^2} - \frac{1}{2}}{(x-2)}$ ← $2x^2$

$\lim_{x\to 2} \frac{4-x^2}{(x-2)\cdot 2x^2}$

$\lim_{x\to 2} \frac{(2-x)(2+x)}{(x-2)\cdot 2x^2}$

$\lim_{x\to 2} \frac{-1(2+x)}{2x^2}$

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

$= \frac{-4}{8} = \boxed{\frac{-1}{2}}$

6) $\lim_{x\to 3} \frac{(\sqrt{x-2}-1)}{x-3}$ → $\frac{0}{0}$

$\cdot \frac{(\sqrt{x-2}+1)}{(\sqrt{x-2}+1)}$

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

$\lim_{x\to 3} \frac{(x-3)\,1}{(x-3)(\sqrt{x-2}+1)} = \frac{1}{\sqrt{1}+1} = \boxed{\frac{1}{2}}$

7) $\lim_{x\to 6} \dfrac{3x^2-17x-6}{36-x^2}$ → $\frac{0}{0}$

$-18 \cdot +1 = -18$, $3 \cdot 3 = 9$, $-18 + 9 = -17$

$$\lim_{x\to 6} \frac{(x-6)(3x+1)}{(6-x)(6+x)}$$

$$\lim_{x\to 6} \frac{-1(3x+1)}{6+x} = \frac{-1(19)}{12} = \boxed{\frac{-19}{12}}$$

8) $\lim_{x\to 0} \dfrac{\left(\frac{1}{1+x}-1\right)}{x}$ → $\frac{0}{0}$, multiply by $(1+x)$

$$\lim_{x\to 0} \frac{1-(1+x)}{x(1+x)}$$

$$\lim_{x\to 0} \frac{1-1-x}{x(1+x)}$$

$$\lim_{x\to 0} \frac{-x}{x(1+x)}$$

$$\lim_{x\to 0} \frac{-1}{1+x} = \frac{-1}{1}$$

$$= \boxed{-1}$$

9) $\lim_{x\to 1} \dfrac{\sqrt{x+8}-3}{x-1}$ → $\frac{0}{0}$, multiply by $\frac{\sqrt{x+8}+3}{\sqrt{x+8}+3}$

$$\lim_{x\to 1} \frac{x+8-9}{(x-1)(\sqrt{x+8}+3)}$$

$$\lim_{x\to 1} \frac{(x-1)1}{(x-1)(\sqrt{x+8}+3)} = \frac{1}{\sqrt{9}+3} = \boxed{\frac{1}{6}}$$

10) $\lim_{x\to 1} \dfrac{2x^2-x-3}{x-1} = \dfrac{2-1-3}{1-1} = \dfrac{-2}{0}$

$\boxed{\text{limit DNE}}$

11) $\lim_{x\to 3} \dfrac{4x^2-7x-2}{x-2}$

$$\frac{4(3)^2-7(3)-2}{3-2} = \frac{36-21-2}{1}$$

$$= \boxed{13}$$

12) $\lim_{x\to 1} \dfrac{3x^2-4x+1}{2x^2-x-3}$

$$\frac{3(1)^2-4(1)+1}{2(1)^2-1-3} = \frac{-1+1}{1-3} = \frac{0}{-2}$$

$$= \boxed{0}$$