(b) $\lim\limits_{x \longrightarrow 1} (3x - 2) = \lim\limits_{x \to 1} 3x - 2 = 3 - 2 = 1$

(c) $\lim\limits_{x \longrightarrow 1} \frac{x^2 - 1}{x - 1} = \lim\limits_{x \to 1} \frac{\cancel{(x-1)}(x+1)}{\cancel{x-1}} = 2$

(f) $\lim\limits_{x \longrightarrow 1} \frac{x^3 - 2x^2 + 5x - 4}{x - 1}$

$$\begin{array}{l|l} x^3 - 2x^2 + 5x - 4 & x - 1 \\ \hline -x^3 + x^2 & x^2 - x + 4 \\ -x^2 + 5x & \\ x^2 - x & \\ 4x - 4 & \end{array}$$

$$\lim_{x \to 1} \frac{(x^2 - x + 4)\cancel{(x-1)}}{\cancel{(x-1)}} = 4 //$$

(j) $\lim\limits_{x \longrightarrow 3} \frac{x^2 - 9}{x^2 - 3x} = \lim\limits_{x \to 3} \frac{\cancel{(x-3)}(x+3)}{x\cancel{(x-3)}} = \lim\limits_{x \to 3} \frac{(3+x)}{x} = 2$

(k) $\lim\limits_{x \longrightarrow 0} \dfrac{\sqrt{x+4}-2}{x}$

$U = \sqrt{x+4} \Rightarrow U^2 = x+4 \Rightarrow$

$x = U^2 - 4$

$x \to 0 \Rightarrow U \to 2$

$$\lim_{U \to 2} \frac{U-2}{U^2-4} = \lim_{x \to 2} \frac{\cancel{(U-2)}}{\cancel{(U-2)}(U+2)} = \lim_{U \to 2} \frac{1}{U+2} =$$

$$= \frac{1}{4}$$

(a) $\lim\limits_{x \longrightarrow +\infty} \dfrac{2x^3+5x+1}{x^4+5x^3+3}$

$$= \lim_{x \to \infty} \frac{\cancel{x^3}\left(2 + \overset{0}{5/x^2} + \overset{0}{1/x^3}\right)}{\cancel{x^3}\left(x + 5 + \underset{0}{3/x^3}\right)} =$$

$$= 0$$

(b) $\lim\limits_{x \longrightarrow +\infty} \dfrac{3x^4-2}{\sqrt{x^8+3x+4}}$

$$= \lim_{x \to +\infty} \frac{x^4\left(3 - 2/x^4\right)}{\sqrt{x^8 + 3/x^4 + 4/x^8}} =$$

$$= \lim_{x \to +\infty} \frac{\cancel{x^4}\left(3-2/x^4\right)}{\cancel{x^4}\sqrt{1 + 3/x^7 + 4/x^8}} = 3$$

(f) $\lim\limits_{x \longrightarrow +\infty} \dfrac{\sqrt{x^2+1}}{3x+2}$

$$= \lim_{x \to +\infty} \frac{\sqrt{x^2(1+1/x^2)}}{x(3+2/x)} = \lim_{x \to \infty} \frac{\cancel{x}\sqrt{1+\underset{\to 0}{1/x^2}}}{\cancel{x}(3+\underset{\to 0}{2/x})} =$$

$$= \frac{1}{3}$$

(g) $\lim\limits_{x\to-\infty} \frac{\sqrt{x^2+1}}{3x+2} = \lim\limits_{x\to-\infty} \frac{\sqrt{x^2(1+1/x^2)}}{x(3+2/x)} =$

$$= \lim_{x\to-\infty} \frac{-\cancel{x}\sqrt{(1+\underbrace{1/x^2}_{0})}}{\cancel{x}(3+\underbrace{2/x}_{0})} = -\frac{1}{3}$$

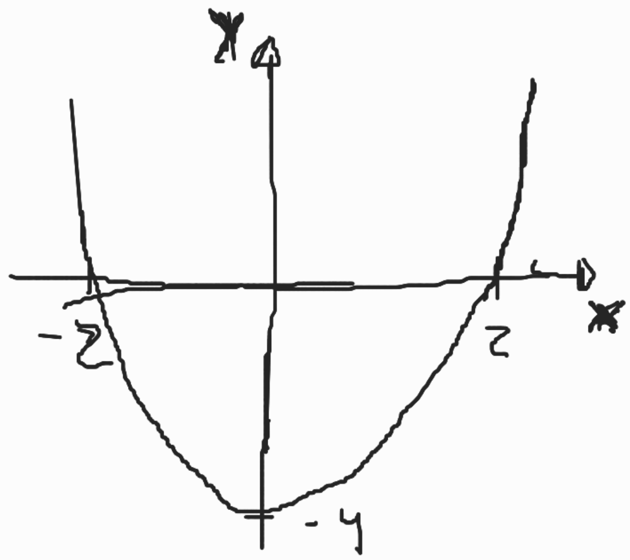
$(a-b)(a+b) = a^2 - b^2$

(h) $\lim\limits_{x\to+\infty}\left(\sqrt{x+1}-\sqrt{x+3}\right) =$

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

$$= \lim_{x\to+\infty} \frac{x+1-x-3}{\sqrt{x+1}+\sqrt{x+3}} = \lim_{x\to+\infty} \frac{-2}{\sqrt{x+1}+\sqrt{x+3}} = 0$$

(b) $\lim\limits_{x\to2^+}\frac{x^2+3x}{x^2-4} = \lim\limits_{x\to2^+} \frac{x(x+3)}{(x-2)(x+2)} = +\infty$



>0

b*) $$\lim_{x \to 2^-} \frac{x(x+3)}{\underbrace{(x-2)}_{<0}(x+2)} = -\infty$$

(g) $$\lim_{x \longrightarrow 3^+} \frac{5}{3-x} = -\infty$$