EXERCISES 2.4:

$$1-\lim_{X\to 3^+}\frac{6x-1}{x^2-9}=\frac{6(3)-1}{3^2-9}=\frac{18-1}{9-9}=\frac{17}{0}=\infty$$

Choose 3.1 is the right of 3 to test the sign

$$\frac{6(3.1)-1}{3.1^2-9}=\frac{+}{9.61-9}=\frac{+}{+}$$

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

Choose 0.1 is the right of 0 to test the sign

$$\frac{3(0.1)-1}{\sqrt{0.1}}=\frac{0.3-1}{+}=\frac{-}{+}=-$$

$$3-\lim_{X\to -3^-}\frac{x+1}{x^2-9}=\frac{-3+1}{(-3)^2-9}=\frac{-2}{9-9}=\frac{-2}{0}=-\infty$$

Choose -3.1 is the left of 3 to test the sign

$$\frac{-3.1+1}{(-3.1)^2-9}=\frac{-}{9.61-9}=\frac{-}{+}=-\infty$$

$$4-\lim_{x\to 0^-}\frac{x+1}{\sqrt{-x}}=\frac{(0)+1}{\sqrt{0}}=\frac{1}{0}=+\infty$$

Choose -0.1 is the left of 0 to test the sign

$$\frac{(-0.1)+1}{\sqrt{-(-0.1)}}=\frac{+}{+}=\frac{+}{+}=+$$

$$5-\lim_{x\to 0^-}\frac{5x-7}{2x-x^2}=\frac{5(0)-7}{0-0}=\frac{-7}{0}=+\infty$$

Choose -0.1 is the left of 0 to test the sign

$$\frac{5(-0.1)-7}{2(-0.1)-(-0.1)^2}=\frac{-0.5-7}{-0.2-0.01}=\frac{-}{-}=+$$

$$7-\lim_{x\to(-\pi/2)}[1-\sec x]=1-\sec(^{-\pi}/_{2})=1-\frac{1}{\cos(-\pi/2)}=1-\frac{1}{\cos(3\pi/2)}=1-\frac{1}{0}$$
$$=1-(-\infty)=1+\infty=\infty$$

عندما نكتب زاويه بالسالب هذا يعني اننا نمشي مع عقارب الساعه في دائرة الوحده $\frac{-\pi}{2}$

يسار الزاويه المذكوره يعني الزاويه التي قبلها بمعنى يسار الزاويه ٢٧٠ يعني في الربع الثالث ولذلك ستكون الناتج سالب

$$8-\lim_{x\to -3^+}\frac{(x+5)^{-2}}{x+3}=\lim_{x\to -3^+}\frac{1}{(x+3)(x+5)^2}=\frac{1}{(-3+3)(-3+5)^2}=\frac{1}{(0)(2)^2}=\frac{1}{0}=\infty$$

Choose 3.1 is the right of 3 to test the sign

$$\frac{1}{(3.1+3)(3.1+5)^2}=\frac{+}{+}=+$$

$$9-\lim_{x\to(3\pi/2)^-}\tan(x)=\tan\frac{3\pi}{2}=\frac{\sin(3\pi/2)}{\cos(3\pi/2)}=\frac{-1}{0}=+\infty$$

يسار الزاويه ٢٧٠ يعني اصغر من ٢٧٠ يعني في الربع الثالث فستكون الداله موجبه

$$10-\lim_{x\to-2^-}\frac{x^2+4}{2x^2-8}=\frac{(-2)^2+4}{2(-2)^2-8}=\frac{4+4}{8-8}=\frac{8}{0}=\infty$$

Choose -2.1 is the left of -2 to test the sign

$$\frac{(-2.1)^2+4}{2(-2.1)^2-8}=\frac{+}{8.82-8}=\frac{+}{+}=+$$

$$15-\lim_{x\to0^-}\frac{2-x}{\sqrt{x}}=\frac{2-0}{\sqrt{0}}=\frac{2}{0}=does\ not\ exist$$

Choose -0.1 is the left of 0 to test the sign

$$\frac{2-(-0.1)}{\sqrt{-0.1}}=\frac{+}{undefined}=does\ not\ exist$$

او من البدايه مجال الداله في المقام اكبر من او يساوي صفر ولانه يريد يسار الصفر او اقل من الصفر يعني خارج المجال وبالتالي لا يوجد رسم فالنهايه غير موجوده

$$18-\lim_{x\to1^-}\frac{3}{(x-1)^3}=\frac{3}{(1-1)^3}=\frac{3}{0}=-\infty$$

Choose 0.9 is the left of 1 to test the sign

$$\frac{3}{(0.9-1)^3}=\frac{+}{-^3}=\frac{+}{-}=-$$

$$f(x)=\frac{1}{|x+1|}$$

$$|x+1|=\begin{cases}(x+1) & if\ x+1>0\\-(x+1) & if\ x+1<0\end{cases}$$

$$|x+1|=\begin{cases}(x+1) & if\ x>-1\\-(x+1) & if\ x<-1\end{cases}$$

Then,

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

Choose -0.9 is the right of -1 to test the sign

$$\frac{1}{-0.9+1}=\frac{+}{+}=+$$

And,

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

Choose -1.1 is the left of -1 to test the sign

$$\frac{1}{-(-1.1+1)}=\frac{+}{(-)(-)}=\frac{+}{+}=+$$

But,

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

And,

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

$$20-\lim_{x\to 0^+}\left(\tan x+\frac{1}{x}\right)=\tan(0)+\frac{1}{0}=0+\frac{1}{0}=0+\infty=\infty$$

Choose 0.1 is the right of 0 to test the sign

$$\frac{1}{0.1}=\frac{+}{+}=+$$

$$\lim_{x\to 0^-}\left(\tan x+\frac{1}{x}\right)=\tan(0)+\frac{1}{0}=0+\frac{1}{0}=0+(-\infty)=-\infty$$

Choose -0.1 is the right of 0 to test the sign

$$\frac{1}{-0.1}=\frac{+}{-}=-$$

$$\lim_{x\to \pi/2^+}\left(\tan x+\frac{1}{x}\right)=\tan\left(\frac{\pi}{2}\right)+\frac{1}{\pi/2}=-\infty+\frac{2}{\pi}=-\infty$$

The right of $\frac{\pi}{2}$ is in second quarter in the unit circle such that tan in the second is negative

على يمين الزاويه اي اكبر منها وذلك يقع في الربع الثاني لذلك الداله ستكون سالبه

$$\lim_{x\to \pi/2}\left(\tan x+\frac{1}{x}\right)=\tan\left(\frac{\pi}{2}\right)+\frac{1}{\pi/2}=+\infty+\frac{2}{\pi}=+\infty$$

The right of $\frac{\pi}{2}$ is in first quarter in the unit circle such that tan in the first is positive

على يسار الزاويه اي اصغر منها وذلك يقع في الربع الأول لذلك الداله ستكون موجبه

$$\lim_{x\to 0^+}\left(\frac{1}{\sqrt[3]{x}}+\frac{1}{\sqrt[3]{x-1}}\right)=\frac{1}{\sqrt[3]{0}}+\frac{1}{\sqrt[3]{0-1}}=\frac{1}{0}+\frac{1}{\sqrt[3]{-1}}=\infty+\frac{1}{-1}=\infty-1=\infty$$

Choose 0.1 is the right of 0 to test the sign

$$\frac{1}{\sqrt[3]{0.1}} = \frac{+}{+} = +$$

$$\lim_{x\to 0^-}\left(\frac{1}{\sqrt[3]{x}} + \frac{1}{\sqrt[3]{x-1}}\right) = \frac{1}{\sqrt[3]{0}} + \frac{1}{\sqrt[3]{0-1}} = \frac{1}{0} + \frac{1}{\sqrt[3]{-1}} = -\infty + \frac{1}{-1} = -\infty - 1 = -\infty$$

Choose -0.1 is the right of 0 to test the sign

$$\frac{1}{\sqrt[3]{-0.1}} = \frac{+}{-} = -$$

$$\lim_{x\to 1^+}\left(\frac{1}{\sqrt[3]{x}} + \frac{1}{\sqrt[3]{x-1}}\right) = \frac{1}{\sqrt[3]{1}} + \frac{1}{\sqrt[3]{1-1}} = \frac{1}{1} + \frac{1}{\sqrt[3]{0}} = 1 + \frac{1}{0} = 1 + \infty = \infty$$

Choose 1.1 is the right of 1 to test the sign

$$\frac{1}{\sqrt[3]{1.1-1}} = \frac{1}{\sqrt[3]{+}} = \frac{+}{+} = +$$

$$\lim_{x\to 0^-}\left(\frac{1}{\sqrt[3]{x}} + \frac{1}{\sqrt[3]{x-1}}\right) = \frac{1}{\sqrt[3]{1}} + \frac{1}{\sqrt[3]{1-1}} = \frac{1}{1} + \frac{1}{\sqrt[3]{0}} = 1 + \frac{1}{0} = 1 + \infty = \infty$$

Choose 0.9 is the right of 1 to test the sign

$$\frac{1}{\sqrt[3]{0.1-1}} = \frac{1}{\sqrt[3]{-}} = \frac{+}{-} = -$$

Find the vertical asymptotes of:

$25 - y = \frac{x^2+2x+1}{x-7} = \frac{(x+1)(x+1)}{(x-7)}$

Then the vertical asymptotes is a solution of $\mathrm{x} - 7 = 0 \Rightarrow \mathrm{x} = 7$

$$27 - y = \frac{x+1}{x^2-3x} = \frac{(x+1)}{x(x-3)}$$

Then the vertical asymptotes is a solution of$x(x-3) = 0 \Rightarrow \mathrm{x} = 0 \text{ or } \mathrm{x} = 3$

$$28 - y = \frac{x^2-1}{x} = \frac{(x+1)(x+1)}{x}$$

Then the vertical asymptotes is a solution of$x = 0 \Rightarrow \mathrm{x} = 0$

$$31 - y = \frac{(x-1)^{-2}}{(x+3)} = \frac{1}{(x+3)(x-1)^2}$$

Then the vertical asymptotes is a solution of

$$(x+3)(x-1)^2 = 0 \Rightarrow \mathrm{x} + 3 = 0 \text{ or } (x-1)^2 = 0 \Longrightarrow \mathrm{x} = 3\text{or } x - 1 = 0$$

$$\Longrightarrow \mathrm{x} = 3 \text{or } x = 1$$