ENG. Mahdi Alsiddig
0563938879

1.1 Introduction to Limit

Example 1 : Find $\lim_{x\to 3}(4x-5)$

Solution

$$\lim_{x\to 3}(4x-5) = 4(3)-5 = 12-5 = 7$$

Example 2 : Find $\lim_{x\to 3}\frac{x^2-x-6}{x-3}$

Solution

$$\lim_{x\to 3}\frac{x^2-x-6}{x-3} = \frac{9-3-6}{3-3} = \frac{0}{0}$$

اذًا نبحث عن حل اخر (عن طريق التحليل) :

$$\lim_{x\to 3}\frac{x^2-x-6}{x-3} = \lim_{x\to 3}\frac{(x-3)(x+2)}{x-3} = \lim_{x\to 3}(x+2) = 3+2 = 5$$

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Example 3 : Find $\lim_{x\to 0} \frac{\sin x}{x}$

Solution

$$\lim_{x\to 0} \frac{\sin x}{x} = \frac{\sin 0}{0} = \frac{0}{0}$$

اذًا نبحث عن حل اخر (عن طريق الالة الحاسبة) :

x	$\frac{\sin x}{x}$
1	*0.84147*
0.1	*0.99833*
0.01	*0.99998*
↓	↓
0	*?*
↑	↑
-0.01	*0.99998*
-0.1	*0.99833*
-1	*0.84147*

$$\therefore \lim_{x\to 0} \frac{\sin x}{x} = 1$$

Example 4 : Find $\lim_{x\to 0} \left[x^2 - \frac{\cos x}{10000}\right]$

Solution

$$\lim_{x\to 0} \left[x^2 - \frac{\cos x}{10000}\right] = 0^2 - \frac{\cos 0}{10000} = -\frac{1}{10000}$$