Companion to Practical French for Anglophone Learners

cal French for Anglophone Learners

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COURSE: ENG 281 - ENGINEERING MATHS
DEPT: COMPUTER ENG.

(a) Show that the limit of the function given in Equation (1.1) as n approaches 0 is a/b.

$$f(n) = \frac{\sin a(n)}{bn}$$

Sol:

Direct substitution

$$\lim_{n \to 0} \frac{\sin a(n)}{bn} = \frac{\sin a(0)}{b(0)}$$

$$= \frac{0}{0} = 0$$

= Indeterminant

using L'hopital's rule

$$\lim_{n \to 0} \frac{\sin a(n)}{bn} = \frac{a \cos an}{b} = \frac{a \cos a(0)}{b}$$

$$= \frac{a \cos 0}{b} = \frac{a}{b}$$

(b) The model of a system has been developed to be given in equation (1.2)

$$f(n) = 5n - 21$$

given that $\delta = 0.1$ and $\Delta\delta = 0.01$, demonstrate, in tabular form, that the limit of the model as $n \to 6$ is equal to 9.

Sol:

$\delta = 0.1$ $\quad \Delta\delta = 0.01$ $\quad 6 - 0.1 = 5.9$

$\varepsilon = 0.5$ $\quad \Delta\varepsilon = 0.05$ $\quad 9 - 0.5 = 8.5$

$0.01 + x$	$0.05 + \varepsilon$	$y - 0.01$	$y - 0.05$
5.9	8.5	6.1	9.50
5.91	8.55	6.09	9.45
5.92	8.60	6.08	9.40
5.93	8.65	6.07	9.35
5.94	8.70	6.06	9.30
5.95	8.75	6.05	9.25
5.96	8.80	6.04	9.20
5.97	8.85	6.03	9.15
5.98	8.90	6.02	9.10
5.99	8.95	6.01	9.05
6	9	6	9

(c) Show whether the function in equation (1.3) is continuous on the interval $(-5, 5)$

$$f(x) = (25 - x^2)^{1/2}$$

Sol

For -5:

$$\lim_{x \to -5} (25 - x^2)^{1/2} = (25 - (-5)^2)^{1/2}$$
$$= (25 - 25)^{1/2}$$
$$= 0$$

For -4

$$\lim_{x \to -4} (25 - x^2)^{1/2} = (25 - (-4)^2)^{1/2}$$
$$= (25 - 16)^{1/2}$$
$$= \sqrt{9} = 3$$

For -3

$$\lim_{x \to -3} (25 - x^2)^{1/2} = (25 - (-3)^2)^{1/2}$$
$$= (25 - 9)^{1/2}$$
$$= \sqrt{16} = 4$$

For -2

$$\lim_{x \to -2} (25 - x^2)^{1/2} = (25 - (-2)^2)^{1/2}$$
$$= (25 - 4)^{1/2}$$
$$= \sqrt{21} = 4.58$$

For -1

$\lim_{n \to -1} (25 - n^2)^{1/2} = (25 - (-1)^2)^{1/2}$

$= (25 - 1)^{1/2}$

$= \sqrt{24} = 4.89$

For 0

$\lim_{n \to 0} (25 - n^2)^{1/2} = (25 - (0)^2)^{1/2}$

$= (25 - 0)^{1/2}$

$= \sqrt{25} = 5$

For 1:

$\lim_{n \to 1} (25 - n^2)^{1/2} = (25 - (1)^2)^{1/2}$

$= (25 - 1)^{1/2}$

$= \sqrt{24} = 4.89$

For 2

$\lim_{n \to 2} (25 - n^2)^{1/2} = (25 - (2)^2)^{1/2} = 4.58$

For 3:

$\lim_{n \to 3} (25 - n^2)^{1/2} = (25 - (3)^2)^{1/2} = 4$

For 4:

$\lim_{n \to 4} (25 - n^2)^{1/2} = (25 - (4)^2)^{1/2} = 3$

For 5

$\lim_{n \to 5} (25 - n^2)^{1/2} = (25 - (5)^2)^{1/2} = 0$

∴ the ~~interv~~ function $f(n) = (25 - n^2)^{1/2}$ is continuous on the interval $(-5, 5)$