FICHA 1: LÍMITES DE SUCESIONES PARTEII

47.- $\lim\limits_{n\to\infty}\left(\frac{3+n}{5+n}\right)^{2n} = \lim\limits_{n\to\infty}\left(1+\frac{3+n-5-n}{5+n}\right)^{2n} = \lim\limits_{n\to\infty}\left(1+\frac{-2}{5+n}\right)^{2n}$

$= \lim\limits_{n\to\infty}\left(1+\frac{1}{\frac{5+n}{-2}}\right)^{\frac{5+n}{-2}\cdot\frac{-2}{5+n}\cdot 2n} = e^{-4}$ //

48.- $\lim\limits_{n\to\infty}\left(\frac{2n^7-4n^3-1}{2n^7+5n^2-n}\right)^{3n^4} = \lim\limits_{n\to\infty}\left(1+\frac{2n^7-4n^3-1-2n^7-5n^2+n}{2n^7+5n^2-n}\right)^{3n^4} =$

$= \lim\limits_{n\to\infty}\left(1+\frac{1}{\frac{2n^7+5n^2-n}{-4n^3-5n^2+n}}\right)^{3n^4} = e^{-6}$ //

49.- $\lim\limits_{n\to\infty}\left(\frac{3n+5}{3n-8}\right)^{\frac{7n}{n^2+1}} = \lim\limits_{n\to\infty}\left(1+\frac{3n+5-3n+8}{3n-8}\right)^{\frac{7n}{n^2+1}} = \lim\limits_{n\to\infty}\left(1+\frac{1}{3n-8/13}\right)^{\frac{7n}{n^2+1}} =$

$= \lim\limits_{n\to\infty}\left(1+\frac{1}{\frac{3n-18}{13}}\right)^{\frac{3n-18}{13}\cdot\frac{13}{3n-18}\cdot\frac{7n}{n^2+1}} = e^{0} = 1$ //

50.- $\lim\limits_{n\to\infty}\left(\frac{3n-1}{5n+2}\right)^{n+3} = \left(\frac{3}{5}\right)^{\infty} = 0$ //

51.- $\lim\limits_{n\to\infty}\frac{\frac{1}{n^2}+\frac{1}{n}}{\frac{2}{n}-\frac{3}{n^2}} = \lim\limits_{n\to\infty}\frac{\frac{1+n}{\cancel{n^2}}}{\frac{2n-3}{\cancel{n^2}}} = \lim\limits_{n\to\infty}\frac{1+n}{2n-3} = 1/2$ //

52.- $\lim_{n\to\infty}\left(\frac{n^2+1}{n}-\frac{n^2+2}{3n}\right) = \lim_{n\to\infty} \frac{3n^2+3-n^2-2}{3n} =$

$$= \lim_{n\to\infty} \frac{2n^2+1}{3n} = +\infty$$

53.- $\lim_{n\to\infty}\left(2n^2-\sqrt{n^2-3}\right) = \lim_{n\to\infty} \frac{(2n^2-\sqrt{n^2-3})\cdot(2n^2+\sqrt{n^2-3})}{2n^2+\sqrt{n^2-3}} =$

$$= \lim_{n\to\infty} \frac{4n^4-n^2+3}{2n^2+\sqrt{n^2-3}} = +\infty$$

54.- $\lim_{n\to\infty}\frac{\sqrt{n^2+2n}-n}{\sqrt{4n^2+5n}-2n} = \lim_{n\to\infty} \frac{(\sqrt{n^2+2n}-n)(\sqrt{n^2+2n}+n)\cdot(\sqrt{4n^2+5n}+2n)}{(\sqrt{4n^2+5n}-2n)(\sqrt{4n^2+5n}+2n)(\sqrt{n^2+2n}+n)} =$

$$= \lim_{n\to\infty} \frac{(\cancel{n^2}+2n-\cancel{n^2})(\sqrt{4n^2+5n}+2n)}{(\cancel{4n^2}+5n-\cancel{4n^2})\cdot(\sqrt{n^2+2n}+n)} = \lim_{n\to\infty} \frac{2n(\sqrt{4n^2+5n}+2n)}{5n(\sqrt{n^2+2n}+n)} = \frac{2\cdot(2+2)}{5\cdot(1+1)} = \frac{4}{5}$$

55.- $\lim_{n\to\infty}\sqrt[n]{\left(\frac{2n+4}{2n-1}\right)^{\frac{n^2+1}{2}}} = \lim_{n\to\infty}\left(\frac{2n+4}{2n-1}\right)^{\frac{n^2+1}{2n}} = \lim_{n\to\infty}\left(1+\frac{2n+4-2n+1}{2n-1}\right)^{\frac{n^2+1}{2n}} =$

$$= \lim_{n\to\infty}\left(1+\frac{5}{2n-1}\right)^{\frac{n^2+1}{2n}} = \lim_{n\to\infty}\left(1+\frac{1}{\frac{2n-1}{5}}\right)^{\frac{2n-1}{5}\cdot\frac{5}{2n-1}\cdot\frac{n^2+1}{2n}} =$$

$$= e^{\lim_{n\to\infty}\frac{5n^2+5}{4n^2-2n}} = e^{5/4}$$

56.- $\lim_{n\to\infty}\left(\sqrt{n}-\sqrt{n-1}\right) = \lim_{n\to\infty}\frac{(\sqrt{n}-\sqrt{n-1})(\sqrt{n}+\sqrt{n-1})}{\sqrt{n}+\sqrt{n+1}} = \lim_{n\to\infty}\frac{n-n+1}{\sqrt{n}+\sqrt{n+1}} =$

$$= \lim_{n\to\infty}\frac{1}{\sqrt{n}+\sqrt{n+1}} = 0$$

57.- $\lim_{n\to\infty}\left(-n^5+20n^3-400n+5\right) = -\infty$ //

58.- $\lim_{n\to\infty}\left(3n^2-2n+5\right) = \infty$ //

59.- $\lim_{n\to\infty}\frac{2n^2-3n+5}{3n^2+5n+6} = 2/3$ //

60.- $\lim_{n\to\infty}\left(\frac{3n^2-2n+3}{2n+1}-\frac{6n-9}{4}\right) = \lim_{n\to\infty}\frac{12n^2-8n+12-(6n-9).(2n+1)}{4.(2n+1)} =$

$= \lim_{n\to\infty}\frac{\cancel{12n^2}-8n+12-\cancel{12n^2}-6n+18n+9}{8n+4} = \lim_{n\to\infty}\frac{4n+\cdots}{8n+\cdots} = \frac{1}{2}$ //

61.- $\lim_{n\to\infty}\left(\frac{n^3-2n}{n^2-2n+1}-\frac{3n^2-4n+1}{n+1}\right) = \lim_{n\to\infty}\frac{(n^3-2n).(n+1)-(3n^2-4n+1)(n^2-2n+1)}{(n-1)^2(n+1)} =$

$= \lim_{n\to\infty}\frac{n^4+n^3-2n^2-2n-3n^4+6n^3-3n^2+4n^3-8n^2+4n-n^2+2n-1}{(n-1)^2.(n+1)} = -\infty$ //

62.- $\lim_{n\to\infty}(\sqrt{n^2-4}-n) = \lim_{n\to\infty}\frac{(\sqrt{n^2-4}-n).(\sqrt{n^2-4}+n)}{\sqrt{n^2-4}+n} =$

$= \lim_{n\to\infty}\frac{\cancel{n^2}-4-\cancel{n^2}}{\sqrt{n^2-4}+n} = 0$ //

63.- $\lim_{n\to\infty}\frac{2n^3-6n^2+5n-4}{1+2n+3n^2-5n^3} = -2/5$ //

64.- $\lim_{n\to\infty}\left(\frac{5n^2-6n+2}{3n+4}-\frac{5n+4}{3}\right) = \lim_{n\to\infty}\frac{15n^2-18n+6-(5n+4).(3n+4)}{3(3n+4)} =$

$= \lim_{n\to\infty}\frac{\cancel{15n^2}-18n+6-\cancel{15n^2}-20n-12n-16}{3(3n+4)} = \frac{-50}{9}$ //

65.- $\lim_{n\to\infty}\frac{\sqrt{9n^2+4}-3n}{2n+1} = \lim_{n\to\infty}\frac{(\sqrt{9n^2+4}-3n).(\sqrt{9n^2+4}+3n)}{(2n+1).(\sqrt{9n^2+4}+3n)} =$

$$= \lim_{n\to\infty}\frac{9n^2+4-9n^2}{(2n+1).(\sqrt{9n^2+4}+3n)} = 0 \text{ //}$$

66.- $\lim_{n\to\infty}\left(\frac{2n^3+3n}{n^2+3}-\frac{6n^2-2}{3n+1}\right) = \lim_{n\to\infty}\frac{(2n^3+3n)(3n+1)-(6n^2-2).(n^2+3)}{(n^2+3)(3n+1)} =$

$$= \lim_{n\to\infty}\frac{6n^4+2n^3+9n^2+3n-6n^4-18n^2+2n^2+6}{3n^3+\dots} = \frac{2}{3} \text{ //}$$

67.- $\lim_{n\to\infty}\frac{3n+2}{n-\sqrt{n^2+5}} = \lim_{n\to\infty}\frac{(3n+2)(n+\sqrt{n^2+5})}{(n+\sqrt{n^2+5})(n-\sqrt{n^2+5})} =$

$$= \lim_{n\to\infty}\frac{(3n+2).(n+\sqrt{n^2+5})}{\cancel{n^2}-n^2-5} = +\infty \text{ //}$$

68.- $\lim_{n\to\infty}(10-5n^2+15n^3-n^5) = -\infty$

69.- $\lim_{n\to\infty}\frac{n-\sqrt{n^2-4}}{n+1} = \lim_{n\to\infty}\frac{(n-\sqrt{n^2-4}).(n+\sqrt{n^2-4})}{(n+1)(n+\sqrt{n^2-4})} =$

$$= \lim_{n\to\infty}\frac{\cancel{n^2}-\cancel{n^2}+4}{(n+1).(n+\sqrt{n^2-4})} = 0 \text{ //}$$

70.- $\lim_{n\to\infty}\left(\frac{3}{n+1}-\frac{2}{n^2-1}\right) = 0 \text{ //}$

71.- $\lim_{n\to\infty}\left(2n+1-\frac{6n^2-5n}{3n+4}\right) = \lim_{n\to\infty}\frac{(2n+1).(3n+4)-6n^2+5n}{3n+4} =$

$$= \lim_{n\to\infty}\frac{6n^2+8n+3n+4-6n^2+5n}{3n+4} = 16/3 \text{ //}$$

72.- $\lim_{n\to\infty}\frac{(n+1)\cdot(n-1)+3}{(3n-2)\cdot(n-5)} = \lim_{n\to\infty}\frac{n^2-1+3}{3n^2-15n-2n+10} = 1/3 \text{ //}$

73.- $\lim_{n\to\infty}\left(\frac{n^2-3n+2}{2n-1}\right)^{n^2+2n} = \infty^{\infty} = \infty$ //

74.- $\lim_{n\to\infty}\left(\frac{n^2-3n+2}{2n-1}\right)^{-n^2+2n} = \infty^{-\infty} = \frac{1}{\infty^{\infty}} = \frac{1}{\infty} = 0$ //

75.- $\lim_{n\to\infty}\left(\frac{2n^2-3n+2}{2n-1}\right)^{n^2+2n} = \infty^{\infty} = \infty$ //

76.- $\lim_{n\to\infty}\frac{(n+1)\cdot(n-3)-(n+1)}{(n-4)\cdot(n+1)} = \lim_{n\to\infty}\frac{n^2-3n+n-3-n-1}{n^2+n-4n-4} = 1$ //

77.- $\lim_{n\to\infty}\left(\frac{n^2-3n}{n-1} : \frac{2+n}{n+3}\right) = \lim_{n\to\infty}\frac{(n^2-3n).(n+3)}{(n-1)(n+2)} = \lim_{n\to\infty}\frac{n^3+\cdots}{n^2\cdots} = +\infty$ //

78.- $\lim_{n\to\infty}\left(\frac{2n+1}{3n-4}\right)^{\frac{3n-1}{7}} = \left(\frac{2}{3}\right)^{\infty} = 0$ //

79.- $\lim_{n\to\infty}\left(\frac{\frac{n^2-1}{3n+2}-\frac{n-1}{2n+3}}{\frac{n^3-n}{n^2+4}}\right) = \lim_{n\to\infty}\frac{\frac{(n^2-1)(2n+3)-(n-1).(3n+2)}{(3n+2).(2n+3)}}{\frac{n^3-n}{n^2+4}} =$

$= \lim_{n\to\infty}\frac{[2n^3+\cancel{3n^2}-\cancel{2n}-3-\cancel{3n^2}+\cancel{2n}+3n+2].(n^2+4)}{(3n+2).(2n+3)(n^3-n)} = \lim_{n\to\infty}\frac{2n^5+\cdots}{6n^5+\cdots} = 1/3$ //

80.- $\lim_{n\to\infty}\left(\frac{2n-6}{5}\right)^{\frac{2-5n}{3n-4}} = \infty^{-5/3} = \frac{1}{\infty^{5/3}} = 0$ //

81.- $\lim_{n\to\infty}\left(\sqrt{n+2}-\sqrt{n-2}\right) = \lim_{n\to\infty}\frac{(\sqrt{n+2}-\sqrt{n-2}).(\sqrt{n+2}+\sqrt{n-2})}{\sqrt{n+2}+\sqrt{n-2}} =$

$\lim_{n\to\infty}\frac{\cancel{n}+2-\cancel{n}+2}{\sqrt{}+\sqrt{}} = 0$ //

82.- $\lim_{n\to\infty}\left(\sqrt{n^2}-\sqrt{n^2+1}\right)$

$= \lim_{n\to\infty}\frac{n^2-n^2-1}{\sqrt{n^2}+\sqrt{n^2+1}} = 0$ //

83.- $\lim_{n\to\infty}\sqrt{\frac{4n^3-2}{2n^3+5n^2}} = \sqrt{2}$ //

84.- $\lim_{n\to\infty}\frac{n-3\sqrt{n}}{n} = \lim_{n\to\infty}\frac{(n-3\sqrt{n})(n+3\sqrt{n})}{n.(n+3\sqrt{n})} = \lim_{n\to\infty}\frac{n^2-9n}{n(n+3\sqrt{n})} = 1$ //

85.- $\lim_{n\to\infty}\left(\frac{5n+4}{5n-2}\right)^{3n+7} = [1^\infty] = \lim_{n\to\infty}\left(1+\frac{5n+4-5n+2}{5n+4}\right)^{3n+7} =$

$= \lim_{n\to\infty}\left(1+\frac{1}{\frac{5n+4}{6}}\right)^{\frac{5n+4}{6}\cdot\frac{6}{5n+4}\cdot(3n+7)} = e^{\lim_{n\to\infty}\frac{6(3n+7)}{5n+4}} = e^{18/5}$ //

86.- $\lim_{n\to\infty}\left(\frac{n^2-n+5}{n^2+3n+1}\right)^{\frac{4n^3+5n}{n^2+4}} = [1^\infty] = \lim_{n\to\infty}\left(1+\frac{\cancel{n^2}-n+5-\cancel{n^2}-3n-1}{n^2+3n+1}\right)^{\frac{4n^3+5n}{n^2+4}} =$

$= \lim_{n\to\infty}\left(1+\frac{1}{\frac{n^2+3n+1}{-4n+4}}\right)^{\frac{n^2+3n+1}{-4n+4}\cdot\frac{-4n+4}{n^2+3n+1}\cdot\frac{4n^3+5n}{n^2+4}} =$

$= e^{\lim_{n\to\infty}\frac{-16n^4+\dots}{n^4+\dots}} = e^{-16}$ //

87.- $\lim_{n\to\infty}\left(1+\frac{1}{n}+\frac{1}{n^2}\right) = 1+0+0 = 1$ //

88.- $\lim_{n\to\infty}\left(\frac{n^2+1}{n^2-1}\right)^{\frac{n^2+3}{2n+5}} = \lim_{n\to\infty}\left(1+\frac{n^2+1-n^2+1}{n^2-1}\right)^{\frac{n^2+3}{2n+5}} = \lim_{n\to\infty}\left(1+\frac{1}{\frac{n^2-1}{2}}\right)^{\frac{n^2+3}{2n+5}} =$

$= \lim_{n\to\infty}\left(1+\frac{1}{\frac{n^2-1}{2}}\right)^{\frac{n^2-1}{2}\cdot\frac{2}{n^2-1}\cdot\frac{n^2+3}{2n+5}} = e^{\lim_{n\to\infty}\frac{2n^2+\dots}{2n^3+\dots}} = e^0 = 1$ //

89.- $\lim_{n\to\infty}\left(\sqrt{3n^2-5n+2}+\sqrt{3n^2-5n}\right) = \lim_{n\to\infty}\frac{\cancel{3n^2}-\cancel{5n}+2-\cancel{3n^2}+\cancel{5n}}{\sqrt{3n^2-5n+2}+\sqrt{3n^2-5n}} = \frac{2}{\infty} = 0$ //

90.- $\lim_{n\to\infty}\left(\sqrt{n^2+1}-\sqrt{n^2+n}\right) = \lim_{n\to\infty} \frac{\cancel{n^2}+1-\cancel{n^2}-n}{\sqrt{n^2+1}+\sqrt{n^2+n}} = \lim_{n\to\infty} \frac{1-n}{\sqrt{n^2+1}+\sqrt{n^2+n}} =$

$= \frac{-1}{1+1} = -\frac{1}{2}$ //

91.- $\lim_{n\to\infty}\left(\frac{\sqrt{n^2+1}-\sqrt{3n^2+2}}{n+2}\right) = \lim_{n\to\infty} \frac{n^2+1-3n^2-2}{(n+2).(\sqrt{n^2+1}+\sqrt{3n^2+2})} =$

$= \lim_{n\to\infty} \frac{-2n^2-1}{(n+2).(\sqrt{n^2+1}+\sqrt{3n^2+2})} = \frac{-2}{1.(1+\sqrt{3})} = \frac{-2}{1+\sqrt{3}}$ //

92.- $\lim_{n\to\infty}\frac{3n^2-2}{\sqrt{4n+5}-2n^2} = -\frac{3}{2}$

¡SON DEL MISMO GRADO!

93.- $\lim_{n\to\infty}\left(\frac{2n^2+1}{n^2-5}-\frac{3n^2-3}{n-2}\right) = 2-\infty = -\infty$ //

94.- $\lim_{n\to\infty}\left(n^2-\sqrt{n^2+5}\right) = \lim_{n\to\infty} \frac{\cancel{n^2}-\cancel{n^2}-5}{n^2+\sqrt{n^2+5}} = 0$ //