Re: Limit of function

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ticbol wrote:

> *Robert,*
> *>*
> *lim ln(x^2 −2x +1) / ln(x^10 +3x +1)*
> *x−>inf*
> *>*
> *= (inf)/(inf)*
> *Indeterminate again.*
> *>*
> *Use L'Hopital's Rule again.*
> *>*
> *f(x) = ln(x^2 −2x +1)*
> *So, f'(x) = [1/(x^2 −2x +1)]*(2x −2)*
> *= (2x−2)/(x^2 −2x +1)*
> *>*
> *g(x) = ln(x^10 +3x +1)*
> *So, g'(x) = [1/(x^10 +3x +1)]*(10x^9 +3}*
> *= (10x^9 +3)/(x^10 +3x +1)*
> *>*
> *Then,*
> *lim ln(x^2 −2x +1) / ln(x^10 +3x +1)*
> *x−>inf*
> *>*
> *= lim [(2x−2)/(x^2 −2x +1)] / [(10x^9 +3)/(x^10 +3x +1)]*
> *x−>inf*
> *>*
> *= lim [(2x−2)(x^10 +3x +1)] / [(x^2 −2x +1)(10x^9 +3)]*
> *x−>inf*
> *>*
> *= lim [2x^11 +6x^2 +2x −2x^10 −6x −2] / [10x^11 −20x^10 +10x^9 +3x^2*
> *−6x +3]*
> *x−>inf*
> *>*
> *= lim [2x^11 −2x^10 +6x^2 −4x −2] / [10x^11 −20x^10 +10x^9 +3x^2 −6x*
> *+3]*
> *x−>inf*
> *>*

> *Divide both numerator and denominator by x^11,*
>
> *= lim [2 −2/x +6/x^9 −4/x^10 −2/x^11] / [10 −20/x +10/x^2 +3/x^9*
> *−6/x^10 +3/x^11]*
> *x−>inf*
>
> *= [2] / [10]*
>
> *= 2/10 = 1/5 = 0.2 −−−−−answer.*

Typical "mathematics made difficult" :−(

log(x^2 −2x + 1) = log(x^2) + log(1 − 2/x + 1/x^2) = 2 log x + O(1/x)

similarly

log(x^10 + 3x +1) = 10 log x + O(1/x^9).

Hence
log(x^2 −2x + 1)/log(x^10 + 3x +1) = 2/10 + O(1/(x log x)) −> 1/5
as x −> infinity.

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Robin Chapman, www.maths.ex.ac.uk/~rjc/rjc.html
"Lacan, Jacques, 79, 91−92; mistakes his penis for a square root, 88−9"
Francis Wheen, _How Mumbo−Jumbo Conquered the World_