I.9 Partial Product 2

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Math 361B

March 2, 2019

The first partial product $\prod_{i=1}^{\infty}(1+\frac{f_n}{g_n})$ converges when $g(n)$ is two powers of n greater than $f(n)$, for example, $\prod_{i=1}^{\infty}(1+\frac{n^2+n-3}{n^5+3*n-2})$ converges to about 0.585 while $\prod_{i=1}^{\infty}(1+\frac{n+3}{n^2-2})$ diverges to negative infinity. Furthermore, while experimenting with different values of $f(n)$ and $g(n)$ I found that if $\frac{f(n)}{g(n)}=\frac{n^x}{n^y}$, where $y \geq x+2$, then as the power of the $g(n)$ approaches infinity the partial product converges to two.

The second partial product $\prod_{i=1}^{\infty}(1+b^n)$ converges whenever b is a fraction, for example the partial product $\prod_{i=1}^{\infty}(1+2^n)$ increases to infinity so quickly that python produces an error message when $N > 45$. Then when the partial product is $\prod_{i=1}^{\infty}(1+(\frac{1}{2})^n)$ it quickly converges to about 4.8. Though while experimenting with values of b we found that the partial product it converges significantly faster and to a lower value as b approaches zero.