Lab 4 Tuesday September 19

Infinite Limits

Look at the following functions and before graphing them guess:

1. At which points do you expect the function outputs to get very large? Very negative?
2. Plot the functions together with the functions `10` and `-10` and see if you can restrict the domain until the function is always above/below that line. What if you use `100` and `-100` instead?
3. What happens when the inputs get large? Try plotting with the domain `{x,100,200}` or `{x,-200,-100}`.
4. Do you expect to find any zeroes?

Then plot the functions with the Mathematica `Plot` command. Remember to include a domain!

Coding tips:

- The horizontal asymptotes might be easier to see if the domain is large.
- You can download the "Plot Piecewise Code" from the course website to get a much better view of these graphs, using `PlotPiecewise` instead of `Plot` But this will not work well when you're plotting more than one function at once.
- Remember you can use the `PlotRange` option with `Plot[f[x],{x,-5,5},PlotRange->{-15,15}]` (or with different numbers) to fix the height shown on the graph. This can be useful if too much information is hidden by the scale.
- Pay attention to parentheses! `1/x+1` is not the same thing as `1/(x+1)`.

(a) `1/(x^2-5x+6)`

(b) `1/(x^4+9x^3+29x^2+39x+18)`

(c) `(x-1)^(-2) (x-2)^(-2)`

(d) `(x-1)^(2) / (x-2)^2`

(e) `(x+1)/(Abs[x]-1)`

(f) `(x+1)/Abs[x -1]`
(Why do these two look so different?)

(g) `(2x^2 + 3x +1)/(Abs[x] * x + 1)`

(h) `Tan[x]`

(i) `x * Tan[x]`

(j) `Csc[x]`

(k) `x * Csc[x]`

(l) `x -x ^2`

(m) `1/(x - x^2)`

(n) `Sqrt[x^2+1]-x`