Calculus 140, section 4.9 Graphing

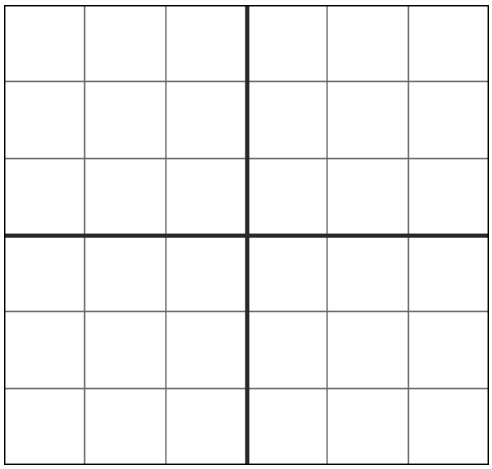
notes by Tim Pilachowski

See table 4.1 in the text for "everything you need to know about graphing before your Exam." We're going to put that all to work in this Lecture.

We're not going to duplicate the work done in Lectures 4.5 and 4.7, however, there is enough information in those Lectures for you to draw the graphs, including intervals increasing and decreasing, extrema, intervals concave up and concave down, and points of inflection. Types of functions covered in the six Examples include polynomial, rational, exponential, logarithmic and trigonometric.

Check out the text's Examples as well.

Example A: Sketch the graph of $f(x) = x^3 - x^2 - x$.



1st derivative:

1st derivative critical numbers:

1st derivative critical points:

extrema (maximum or minimum):

2nd derivative:

2nd derivative critical numbers:

2nd derivative critical points:

concavity and inflection points:

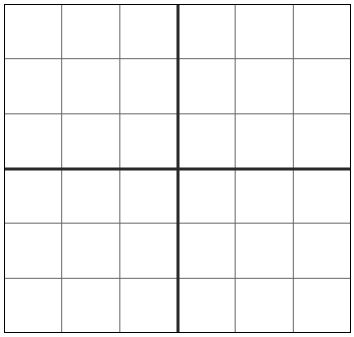
y-intercept:

x-intercepts:

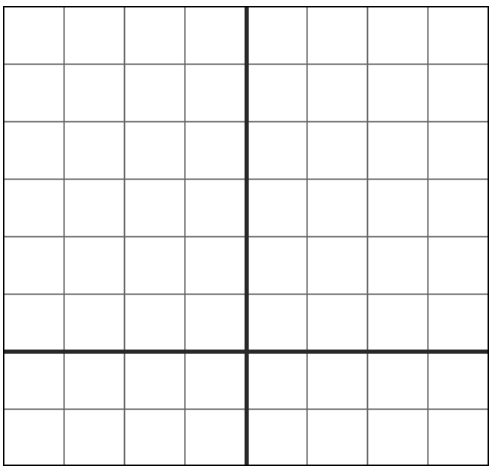
vertical asymptotes:

horizontal asymptotes:

Example A revisited: Sketch the graphs of $f(x)=x^3-x^2-x$ and $g(x)=x$ and shade the region(s) the graphs enclose.



Example B: Sketch the graph of $f(x)=\frac{2}{x}+\frac{1}{x^2}$.



1st derivative:

1st derivative critical numbers:

1st derivative critical points:

extrema (maximum or minimum):

2nd derivative:

2nd derivative critical numbers:

2nd derivative critical points:

concavity and inflection points:

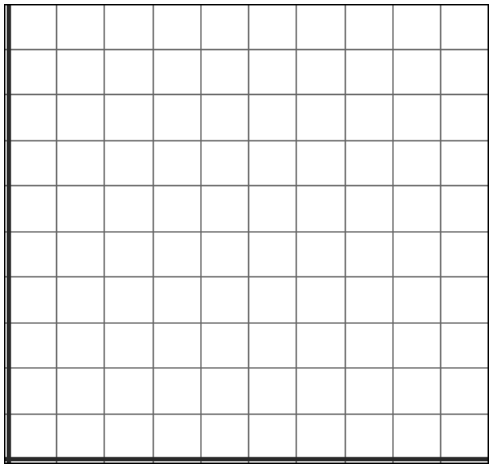
y-intercept:

x-intercepts:

vertical asymptotes:

horizontal asymptotes:

Example C (4.6 Example J revisited): The concentration of a drug in the bloodstream t hours after injection into a muscle is given by $c(t) = 9\left(e^{-0.3t} - e^{-3t}\right)$ units. Sketch the graph of $c(t)$.



domain for this application:

1st derivative:

1st derivative critical numbers:

1st derivative critical points:

extrema (maximum or minimum):

2nd derivative:

2nd derivative critical numbers:

2nd derivative critical points:

concavity and inflection points:

y-intercept:

x-intercepts:

vertical asymptotes:

horizontal asymptotes: